

FISCAL YEAR 1987 ARMS CONTROL IMPACT STATEMENTS

Statements Submitted to the Congress by the
President Pursuant to Section 36 of the Arms
Control and Disarmament Act



APRIL 1986

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FOREWORD

This document contains the fiscal year 1987 arms control impact statements (ACIS), which are submitted annually in accordance with section 36 of the Arms Control and Disarmament Act. Its publication marks the 11th consecutive year that the report has been submitted to Congress by the executive branch.

The timeliness and importance of the ACIS are reflected in the language of the Arms Control and Disarmament Act, which mandates that no request for authorization or appropriations of a major weapons program shall be transmitted to Congress without a complete statement analyzing the impact of the program on arms control policy and negotiations. In short, the ACIS are designed to enable the executive and legislative branches to examine systematically and continuously the arms control implications of major weapons programs. The ACIS also cover major modernization programs for existing systems.

Major weapons programs analyzed in the fiscal year 1987 ACIS include the MX missile, the small ICBM, the B-1B bomber, the Trident program, space defense programs, the strategic defense initiative (SDI), and chemical weapons modernization.

We note that this year's ACIS contains a number of format changes: program descriptions and analyses have been condensed and placed together at the end of each section of related programs; the three-year funding table for each weapons system has been eliminated; a comprehensive arms control policy section has been added; and programs that received in-depth analysis from a previous year, and in which there has been no substantial change in the program for the current year, have been shortened, with reference made to the in-depth ACIS from a previous year.

The views and analysis expressed in the following arms control impact statements are those of the executive branch and not necessarily those of the members of the Senate Committee on Foreign Relations or the House Committee on Foreign Affairs.

RICHARD G. LUGAR,
Chairman, Committee on Foreign Relations.

DANTE B. FASCELL,
Chairman, Committee on Foreign Affairs.

LETTER OF SUBMITTAL

U.S. ARMS CONTROL AND DISARMAMENT AGENCY,
OFFICE OF THE DIRECTOR,
Washington, D.C., February 5, 1986.

Hon. GEORGE BUSH,
President, U.S. Senate.
Hon. THOMAS P. O'NEILL, Jr.,
Speaker of the House of Representatives.

On behalf of the President of the United States, I am submitting the Administration's classified ¹ and unclassified documents entitled fiscal year 1987 Arms Control Impact Statement (ACIS) pursuant to 22 U.S.C. 2576, as amended.

The Fiscal Year 1987 budget cycle marks the 11th year in which arms control impact statements have been submitted to the Congress. This year the ACIS has been reformatted as a single document containing the usual in-depth analyses of major weapons programs meeting the statutory requirements for an impact analysis, as well as having a new and comprehensive section on U.S. arms control policy. The new ACIS documents also contain an arms control treaty annex for reference purposes, and, as provided in previous years, abbreviated analyses on programs which have not received in-depth analyses for reasons indicated therein.

The Administration has concluded that while some defense programs will require continuing review, all of the programs analyzed in the fiscal year 1987 budget are consistent with current U.S. security and arms control policy. The specific programs planned to be carried out during fiscal year 1987 are also consistent with the terms and provisions of existing arms control agreements.

Sincerely yours,

KENNETH L. ADELMAN,
*Director.*⁵

¹ The classified version is retained in committee files. This publication is the unclassified version in its entirety.

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SECTION I

INTRODUCTION

In the past, the Administration has forwarded to the Congress, with the President's budget, separate arms control impact statements and related materials. This year, these items have been collected into this one document. It includes all of the in-depth analyses of major weapon system clusters and research programs that formerly would have been provided separately. The advantages of this presentation are:

- the addition of a new and comprehensive arms control policy section which places the individual impact analyses in the proper context;
- the deletion of redundant material in each analysis, and;
- the inclusion of reference information to help the interested reader obtain additional detail.

After the arms control policy section and the impact analyses themselves, a final section of this document covers those programs for which detailed impact analyses are not included. This happens either because an impact statement on those programs would be redundant, premature, or unnecessary.

Finally, annexes provide excerpts of treaty language that are applicable to the impact analyses, a list of acronyms, and a list of definitions.

We believe that the contents of this single document fulfill the legislative requirements of providing a comprehensive statement of the impact of US defense programs on the arms control process. Congress will have in this one document the information needed to assess the arms control policy and negotiations impact of the defense programs contained in the President's FY 1987 Budget. Furthermore, this consolidation of the arms control analysis process will afford the general reader a greater understanding of the collective impact of all relevant programs.

SECTION II

UNITED STATES ARMS CONTROL POLICY

The primary objective of US foreign and security policy is to protect the integrity of our democratic institutions and promote the peaceful global environment in which they thrive. It is our policy to ensure peace and security by maintaining effective defense and deterrent capabilities and by seeking, wherever possible, to increase cooperation with other nations and negotiate equitable, stabilizing and verifiable arms control agreements.

United States arms control policy is directed toward enhancing the security of the United States and its allies, reducing the risk of war and strengthening global stability. To that end, the United States will seek agreements which:

- achieve a more stable strategic relationship;
- reduce radically the levels and the power of existing and planned nuclear weapons;
- eliminate chemical and biological weapons;
- prevent nuclear proliferation;
- reduce military force levels worldwide.

Arms control agreements are not ends in themselves. Their primary objective is to enhance the security of the nations concluding the agreements. Although agreements may contribute to reduced tension and greater international understanding, those effects, desirable as they may be, cannot replace enhanced security as the benchmark for judging arms control.

In addition to our multilateral and bilateral force reduction negotiations, the US also seeks agreements on confidence building measures and seeks strict compliance with agreements already reached. Since the United States fully complies with its arms control obligations and commitments, it expects other nations to conform to the same standard, insisting on positive, concrete steps to correct non-compliance.

The following review will discuss US arms control policy for strategic nuclear forces, intermediate-range nuclear forces, defense and space arms, non-proliferation and testing of nuclear weapons, and chemical weapons. It concludes with a

discussion of the importance of verification and compliance in realizing the goals of arms control.

Nuclear and Space Talks

On January 8, 1985, the United States and the Soviet Union announced in a joint communique that they had agreed on the subject and objectives for new negotiations on nuclear and space arms. The communique stated, in part:

The sides agree that the subject of the negotiations will be a complex of questions concerning space and nuclear arms, both strategic and intermediate range, with all the questions considered and resolved in their interrelationship. The objective of the negotiations will be to work out effective agreements aimed at preventing an arms race in space and terminating it on earth, at limiting and reducing nuclear arms and at strengthening strategic stability.

The negotiations will be conducted by a delegation from each side, divided into three groups. The sides believe that ultimately the forthcoming negotiations, just as efforts in general to limit and reduce arms, should lead to the complete elimination of nuclear arms everywhere.

The three negotiating groups are Strategic Offensive Arms, Intermediate-Range Nuclear Forces, and Defense and Space.

A. Strategic Offensive Arms

In the strategic offensive arms forum, the US goal remains that of achieving an effectively verifiable agreement providing for deep reductions to equitable levels in strategic nuclear arsenals. The US proposals concentrate on achieving substantial reductions in the numbers, warheads, and destructive capacity of strategic ballistic missiles, as these are the most destabilizing class of weapons. The United States has also proposed limits on heavy bombers and the number of ALCMs they carry. US negotiators have been authorized to explore ways of bridging differences, to find common ground, and to probe for Soviet flexibility on issues of concern to the United States. The United States has made new proposals and has sought to explore trade-offs between US and Soviet areas of advantage that take into account the differences in each side's force structure.

B. Intermediate-Range Nuclear Forces (INF)

The United States' ultimate objective in these negotiations with the USSR has been and remains a zero-zero outcome--the complete, global elimination of the entire class of US/Soviet longer-range INF (LRINF) missiles. The United States is also ready to consider interim steps providing for substantial reductions in LRINF which would establish a global balance at the lowest possible equal levels of LRINF warheads. The United States could also consider not stationing in Europe its full share of the global allowance. In order to take into account expressed Soviet concerns, the United States has reiterated several additional initiatives first proposed in September 1983, such as its readiness to discuss possible intermediate-range aircraft limitations. The United States and its allies are willing to halt, reverse, or dispense with longer-range INF deployment as part of an equitable and verifiable arms control agreement. However, in the absence of such an agreement obviating the need for LRINF deployment, the United States and its NATO Allies will continue with the measured and appropriate modernization of these forces.

C. Defense and Space (D&S)

The third area of negotiation is that of defense and space, but the core issue is the same: the stability of deterrence. The Soviet Union has failed to show the type of restraint, in both strategic offensive and defensive forces, that was hoped for when the SALT process began. In addition, scientific developments and several emerging technologies now offer the possibility of defenses that did not exist and could hardly have been conceived earlier. In the ongoing negotiations with the Soviet Union, we will protect the potential offered by the SDI research program to alter the adverse, long-term prospects we now face, and to provide a basis for a more stable deterrent in the future. In this connection, we have been endeavoring in Geneva to discuss with the Soviets the relationship of offense and defense, including our concerns about Soviet actions which are eroding the ABM Treaty, especially its non-compliance with the Treaty. We have also proposed that our sides agree to begin now to explore means by which a cooperative transition to greater reliance on defensive systems could be accomplished.

The United States is endeavoring in good faith to negotiate with the Soviet Union a mutual and effectively verifiable agreement with the strictest possible limitations on anti-satellite weapons consistent with the national security interests of the United States. However, a number of

serious problems including definitional and monitoring difficulties, the need to counter existing Soviet targeting satellites, and the Soviet operational ASAT capabilities, contribute to the conclusion that a comprehensive ban that would seek to eliminate all ASAT development, testing and deployment, and use of all means of countering satellites, would not be verifiable or in our national interests.

Interim Restraint Policy*

The United States remains determined to pursue negotiations with the Soviet Union aimed at reducing the risk of nuclear war through substantial, verifiable, and stabilizing reductions in nuclear arms. Soviet arms control violations represent a threat to the arms control process. They must be corrected. The United States has repeatedly demonstrated forbearance and moderation while seeking an interim framework of true, mutual restraint, despite the Soviet record of arms control violations over the last few years.

To give the Soviet Union more time to take corrective action, the United States has refrained from undercutting existing strategic arms agreements to the extent that the Soviet Union exercises comparable restraint, and provided that arms reductions are being actively pursued in the current negotiations. At the same time the United States reserves the right to make appropriate and proportionate responses to Soviet non-compliance in order to ensure the security of the United States and its allies and to make clear to Moscow that violations of arms control arrangements entail real costs. This policy will be periodically reviewed in the light of the Soviet compliance record and the Soviet military build-up.

Non-Proliferation

Preventing the spread of nuclear weapons is a longstanding and fundamental security objective of the United States. The United States strongly supports the Non-Proliferation Treaty (NPT) and other non-proliferation measures. The United States believes that efforts to prevent

* For additional detail, see the President's Report to Congress on Building a New Framework for Mutual Restraint (SECRET), the White House Fact Sheet on the same subject dated June 10, 1985, and the January 1984, February 1985, and December 1985 Presidential reports to Congress on Soviet Non-compliance with Arms Control Agreements.

the spread of nuclear weapons strengthens the security of all countries. In addition, US policy seeks to reduce the motivations for acquiring nuclear explosives by improving regional and global stability and addressing the legitimate security concerns of friendly states. The successful outcome of the third NPT Review Conference in September 1985, which reaffirmed the parties' support for the Treaty and their belief that it is essential for international security, supports these objectives.

Nuclear Testing

Consideration of nuclear test limitations has and will continue to be an element of the arms control policy of the United States. However, such limitations must be consistent with United States national security. US testing is required to ensure the continued effectiveness of our deterrent, and to ensure the reliability and safety of the US arsenal. Given the scope and scale of the recent Soviet strategic military buildup, it is vital that we ensure the essential strategic balance which has enabled us to keep the peace between east and west.

Since 1976 the US has abided by the 150 kiloton (kT) test limit of the Threshold Test Ban Treaty (TTBT). The Soviet Union has also pledged to observe this Treaty test limit.

With respect to the TTBT and its companion Peaceful Nuclear Explosions Treaty (PNET), our experience has shown that the United States cannot effectively verify Soviet compliance with the treaties as they now stand. As reported by the President in 1984, and reaffirmed last year, while ambiguities in the pattern of Soviet testing and verification uncertainties continue to exist, evidence available leads to the conclusion that Soviet nuclear testing activities for a number of tests constitute a likely violation of the 150 kT limit. The US has sought on several occasions to engage the USSR in discussion on verification improvements of the test limit. Unfortunately, the Soviets have rejected or not replied to our approaches. For example, as a demonstration of our seriousness, the President unilaterally and unconditionally invited Soviet experts to measure the yield of a US nuclear test at the Nevada test site using any instrumentation devices the Soviet Union deems necessary. It is the President's hope that with this first step a way might be opened which could ultimately lead to effective verification of compliance with the 150 kT limit. The USSR has not responded to this offer.

Thorough evaluation has led the United States to reaffirm that a comprehensive test ban remains a long-term objective of the United States; an objective which we will seek to pursue within the context of broad, deep and effectively verifiable arms reductions, maintenance of a credible nuclear deterrent, the balance of conventional forces, expanded confidence-building measures and improved verification capabilities. There is much to be accomplished with respect to each of these objectives. In the interim, the security of the United States and its allies depends upon our maintaining a credible nuclear deterrent. Nuclear testing helps assure the credibility of this deterrent by permitting modernization of our nuclear weapons in response to new challenges, and to maintain the reliability of those weapons already stockpiled, in the face of the Soviet build-up of nuclear weapons. Testing is the primary means by which we insure that the warheads and weapons systems are safe, that they are reliable and, that they could perform their military missions with as little collateral damage as possible.

Chemical Weapons

The US objective with respect to chemical weapons is to achieve a comprehensive and effectively verifiable global ban. The United States believes existing international law bans the initial use of chemical weapons and the possession and use of biological and toxin weapons. There is, however, continued use of chemical weapons and evidence of proliferation of such weapons. Chemical agents are relatively cheap and can be readily produced or acquired by many countries.

In 1984, the United States proposed a draft treaty on a comprehensive global chemical weapons ban at the Conference on Disarmament in Geneva. The US continues to hope that all participants in the Conference will respond seriously and constructively to this proposal. In the absence of a comprehensive and effectively verifiable ban, the United States is compelled to produce safer, more modern chemical weapons, to have a credible and effective chemical weapons retaliatory stockpile to deter Soviet and other country use of such weapons.

Verification & Compliance

When dealing with an adversary with an essentially closed society, like the Soviet Union, there must be effective means of verification that enable the United States to know with confidence whether the terms of agreements are being honored. In practice, this means the United States must

have the ability to acquire sufficient information to render a reasonable judgment on whether other parties are complying with the terms of an agreement and to render this judgment in a timely manner, such that we can respond appropriately, including compensating for any risk posed to our security by possible violations.

As the President stated in his first report to Congress in January 1984 on Soviet Non-Compliance with Arms Control Agreements:

We should recognize ... that ensuring compliance with arms control agreements remains a serious problem. Better verification and compliance provisions and better treaty drafting will help, and we are working toward this in ongoing negotiations. It is fundamentally important, however, that the Soviets take a constructive attitude toward compliance.

The President's reports of February 1985 and December 1985 on Soviet Non-Compliance with Arms Control Agreements provided the Congress in both classified and unclassified versions substantial and updated information on the continuing pattern of Soviet non-compliance.

In view of the Soviet record, the degree to which possible provisions are verifiable is an important consideration in the process of selecting the limits on and possible reductions in the various weapon systems, particularly the ones analyzed in this Arms Control Impact Statement. Effective verification and compliance are critical to the integrity of the arms control process, especially in view of our concerns with Soviet non-compliance with existing agreements. The arms control process is undermined and new security risks could be created if compliance with agreements cannot be verified or if Soviet compliance is questionable.

In the past, the United States relied primarily on national technical means (NTM) for verification of arms control agreements with the Soviet Union. As such agreements become more complex, the systems they cover become more numerous, and Soviet efforts at concealment and information denial continue, it will be necessary to supplement NTM with other measures of verification. The Administration has made it clear that the United States will insist on positive verification procedures to ensure full compliance with the provisions of any agreement, including the use of measures beyond national technical means to achieve US objectives. The United States must have the

ability to detect violations of arms control agreements, as well as the will and means to prevent the Soviet Union from obtaining military advantages through treaty non-compliance.

Conclusion

United States arms control policy is directed towards enhancing our security and that of our Allies, reducing the risk of war, and strengthening global stability. In this context, arms control is one element of United States national security policy which complements the military security measures that the United States must take unilaterally.

The success of US arms control policy depends upon maintaining military strength, having patience in seeking agreements that strengthen security and stability, and maintaining consensus on goals and objectives, both within the United States and with its Allies. A world free from nuclear, chemical, and biological weapons is an ultimate objective to which the United States, the Soviet Union, and all other nations, can surely agree. Only through the combination of resolve and resilient strength -- the sinews of peace, as Churchill called them -- can we hope to make progress toward this objective.

SECTION III

INDEPTH ARMS CONTROL IMPACT ANALYSES

As prescribed by Section 36 of the Arms Control and Disarmament Act, all Government agency programs for FY 1987 were reviewed to insure that those meeting the nuclear-related, dollar threshold, and technology criteria were assessed as to their impact on arms control policy and negotiations. Programs which met the criteria and were also judged to be of significant national security impact and of special Congressional and public interest were selected for further indepth analyses. This section contains those analyses. They comprise six clusters, each containing related programs, and are:

Airborne Strategic Offensive Systems

Intercontinental Ballistic Missiles

Nuclear Ballistic Missile Submarines/
Sea-Launched Ballistic Missiles

Strategic Defense Initiative

Space Defense

Chemical Weapons

ARMS CONTROL IMPACT ANALYSIS
AIRBORNE STRATEGIC OFFENSIVE SYSTEMS

I. INTRODUCTION

This arms control impact analysis addresses the following Department of Defense (DoD) and Department of Energy (DoE) programs:

<u>PE Number</u>	<u>Program Title</u>
11113F	B-52 Squadrons and Associated Procurement
DoE	B83 (Modern Strategic Bomb)
64361F	Air-Launched Cruise Missile (ALCM) and Associated Procurement
11120F	Advanced Cruise Missile (ACM) and Associated Procurement
DoE	W80-1 (ALCM Warhead)
64738F	Protective Systems
64226F	B-1B Bomber and Associated Procurement
11126F	B-1B Squadrons and Associated Procurement
64234F	Common Strategic Rotary Launcher
63364F	Short-Range Attack Missile II
DoE	Short-Range Attack Missile II Warhead

These programs are analyzed together because each would contribute to the continued viability of the air-breathing element of the US strategic Triad; consequently, their arms control implications are likely to be similar. Analysis of these major programs in concert is necessary to gain full understanding of their arms control implications and to reflect developments in Soviet air defense capabilities.

II. PROGRAM DESCRIPTIONS

Detailed information on the following DoD programs is contained in Supporting Data for Fiscal Year 1987 Budget Estimates, Descriptive Summaries, a classified document published by the Department of the Air Force and submitted to the Congress. Also, additional information on these programs can be found in the FY1986 Arms Control Impact Statement for Airborne Strategic Offensive Systems.

A. B-52 Squadrons (PE 11113F) and Associated Procurement.

This program element consists of major modifications to transition 194 B-52Hs and Gs from a pure penetration force to a weapons system that includes an air-launched cruise missile launch mission and to transition the remaining 69 B-52Gs from nuclear to conventional missions. The B-52 will maintain its combat effectiveness against projected enemy threats by upgrading the aircraft's radar, developing new avionics software, and improving the offensive avionics system.

The FY 1986 program plans called for flight testing of the autopilot upgrade and of the offensive avionics system software. The FY 1987 plans include the completion and integration of the avionics software development program.

B. B83 Modern Strategic Bomb (DoE).

The B83 bomb was produced to modernize the strategic nuclear gravity bomb stockpile. The B83 will upgrade the capability of US strategic aircraft by providing greater flexibility in targeting and employment [deleted], making the weapon effective against hardened Soviet command, control, and communication installations, and against Soviet nuclear storage sites.

The FY 1987 requested funding is for weapon production and stockpile quality assurance surveillance expenses.

C. Air-launched Cruise Missile (ALCM) (PE 64361F) and Associated Procurement.

The ALCM is a small, unmanned, long-range, accurate weapon which has an air-breathing engine and is continuously powered through the atmosphere using aerodynamic lift. It incorporates technological advances in a number of areas and provides the bomber force with a nuclear-armed air-to-ground missile which can be launched outside of enemy air defenses.

It increases B-52 targeting and routing flexibility and reduces bomber exposure to air defenses.

The FY 1986 program plans called for development of missile software improvements, mission planning improvements and completion of depot support development. The FY 1987 plans include complete mission planning improvements and missile software changes.

D. Advanced Cruise Missile and Associated Procurement.

The DoD FY 1987 budget plan also contains funds for continued development of an Advanced Cruise Missile and of associated procurement programs. Development of the ACM is being conducted under a limited access Program Element.

E. W80-1 ALCM Warhead (DoE).

The W80-1 is [deleted] designed for use in the ALCM-B, incorporating improved safety and security features.

The FY 1987 requested funding is for warhead production and stockpile quality assurance surveillance expenses.

F. Protective Systems (PE 64738F).

Protective Systems is a continuing program. Its purpose is to develop, test, and evaluate new countermeasures equipment for strategic aircraft. For FY 1987, this includes development of the ALO 172 countermeasures system for use by the B-52 [deleted]. (The full scale development of this portion of the program ends in FY 1987.)

G. B-1B Bomber (PE 64226F & PE 11126F) and Associated Procurement.

The B-1B bomber is a strategic long-range multi-role weapon system able to perform as a penetrating bomber, or a conventional weapons delivery system, and at some future date may be converted to a cruise missile launch platform.

The B1-B is in its full scale development/production phase. Full operational capability is scheduled for June 1988, when the 100th aircraft will be delivered. The FY 1986 program plans called for procuring the last 48 aircraft and for integrated systems-level flight testing and demonstration of a

wide range of weapons system capabilities. The FY 1987 plans include weapons integration and testing, and aircraft design capability demonstrations.

An Advanced Technology Bomber (ATB) is being developed to follow the B-1B. The ATB will make extensive use of new technologies, and is being developed under a classified program element.

H. Common Strategic Rotary Launcher (PE 64234F).

The Common Strategic Rotary Launcher (CSRL) is being developed for use on the B-52H and the B-1B [deleted]. The CSRL is a multipurpose launcher that can accommodate current and projected gravity weapons, SRAMs, cruise missiles, and future conventional stand off weapons.

The FY 1986 program plans called for flight testing of modified aircraft and launcher designs, weapons jettison and launch, and nuclear certification of both the hardware and the software necessary for internal cruise missile carriage. The FY 1987 plans include technical support for B-1B flight tests and nuclear certification of the B-52H.

I. Short-Range Attack Missile II (PE 63364F).

The Short-Range Attack Missile II (SRAM II) program element provides funding for the development of a second generation Short-Range Attack Missile for the B-1B and ATB. SRAM II will provide the penetrating bomber an improved supersonic, air-to-ground missile that will significantly increase bomber survivability, enhance bomber operational flexibility and tax enemy defenses.

The FY 1986 program plans called for initiation of full scale development in the fourth quarter of the year. The program includes wind tunnel testing, survivability/vulnerability studies, systems engineering, and reliability and maintainability analyses. The FY 1987 plans include continuation of the development contract through critical design review.

J. Short-Range Attack Missile II Warhead (DoE).

The phase 2 study for the SRAM II warhead commenced during the second quarter of FY 1985. The phase 2 study is due to be completed during the 3rd Quarter of FY 1986. The purpose of the study is to establish technical feasibility

of warhead candidates satisfying DoD requirements as communicated during the early part of the Phase II study. FY 1987 plans include customary Phase IIa design definition and cost study activities.

III. SYSTEM DESCRIPTION

A. US Airborne Strategic Offensive Systems.

The program elements described above constitute the modernization of the airborne element of US strategic forces. The US intends to rely on a mixed force of penetrating bombers and stand-off aircraft with cruise missiles to maintain the effectiveness of the air-breathing forces against future, increasingly sophisticated Soviet air defenses. These Soviet defenses, which are not limited by current arms control agreements, are expected to include large numbers of low-altitude-capable, quick-reaction surface-to-air missiles, look-down/shoot-down interceptors integrated with an advanced Soviet Union Airborne Warning and Control System (SUAWACS) and a netted ground control intercept system capable of vectoring interceptors to targets.

In order to meet the more demanding requirements generated by continuing and projected improvements in Soviet air defenses, the Defense Department is providing for the development of an Advanced Technology Bomber (ATB) for deployment in the early 1990s. The ATB is being designed to penetrate all existing and projected Soviet air defenses until well past the turn of the century. [deleted]

The accuracy of the ALCM and the modernization of high yield gravity weapons will also contribute to overall US force effectiveness and flexibility by improving bomber force capabilities against the increasing hardness of the Soviet target base. The ALCM's combination of yield and accuracy could make it a flexible weapon for selective attacks against a wide range of fixed, non-time-urgent military targets.

The improvements envisaged for US airborne strategic offensive forces will contribute to crisis stability. The modernization program will maintain the effectiveness of the US airborne strategic offensive forces in the face of improving Soviet air defenses. Since bomber weapons typically take at least several hours to reach their targets, such forces clearly are not a first-strike threat against the USSR. This and their ability to be recalled after launch enhance crisis stability, while their considerable retaliatory capability enhances deterrence.

Strategic bomber forces are also currently tasked to perform long-range conventional reconnaissance and attack missions. Some B-52s have been equipped with Harpoon anti-ship standoff missiles and play a major role in assisting the US Navy and NATO in the offensive mine warfare mission. The conventional role of the B-52/B-1 force is to attack second/third echelon targets (currently fixed - airfields, storage depots, railyards, POL, and transportation) that are beyond the range of theater-based tactical air. The selective use of long-range strategic air in the conventional role provides additional options and leverage which contribute to the ability of the US/Allies to terminate a conflict using only conventional weapons.

Within the context of the Strategic Triad, the strategic bomber contribution to US retaliatory capabilities has become even more important. The modernization program greatly complicates the Soviets' already formidable air defense problem. Systems based on advanced technologies will enhance the deterrent value of the airborne element of the Triad and thus will have a positive effect on global stability.

B. USSR Airborne Strategic Offensive Forces.*

The Soviets have undertaken several programs since the late 1970s to improve their airborne strategic offensive forces. The new strategic bomber, the BLACKJACK, was first observed in November 1981. [deleted] The aircraft is similar in appearance to, but larger than, the US B-1 bomber. The physical characteristics of the BLACKJACK indicate it is capable of long-range

* See also Soviet Military Power, 1985, (4th edition), [deleted], and the FY 1986 Airborne Strategic Offensive System ACIS.

[deleted]. When the BLACKJACK is deployed, it will probably have the technical capability to carry both bombs and ALCMs. The new heavy bomber is not likely to become operational before [deleted].

The Soviets continue production of a new variant of the BEAR bomber, the BEAR H, which is equipped with the AS-15 air-launched cruise missile (ALCM). The BEAR H is a newly produced airframe rather than a conversion of existing BEAR aircraft. At least [deleted] of these aircraft were produced through December 31, 1985. Although the BEAR production line has been active since the 1950s, this is the first production of a strike model of the BEAR in about seventeen years. Conceivably, the Soviets could produce and deploy about [deleted] of these aircraft per year. The Soviets will likely keep the BEAR Hs as ALCM carriers throughout the 1990s as a complement to the BLACKJACK. Some [deleted] Tu-95 BEAR Bs and Cs originally equipped with [deleted] AS-3 air-to-surface missiles (ASMs), each, are being converted to carry [deleted] AS-4, each, [deleted]. At least [deleted] had been converted by December 31, 1985, and as many as [deleted] others may be undergoing conversion. [deleted]

The BACKFIRE has been produced since 1970 and production is likely to be maintained at least through the end of the decade. The Soviets have deployed a modified version of the BACKFIRE, designated the BACKFIRE C. [deleted]

The Soviets are developing a new long-range cruise missile system. This system includes three variants of a

small, subsonic low-altitude cruise missile similar in design to the US TOMAHAWK--the operational AS-15 (ALCM), the SS-NX-21 sea-launched cruise missile (SLCM), and the SSC-X-4 ground-launched cruise missile (GLCM). These missiles have a maximum range of approximately 3000 kilometers. Deployment of the SLCM and GLCM could begin at any time.

[deleted] In addition, Soviet bombers face a far more modest air defense threat than comparable US aircraft, a factor which must be considered when assessing their threat potential.

IV. ANALYSIS

A. Consistency with US Arms Control Policy and Related Presidential Decisions.

The program elements analyzed in this ACIA are consistent with US arms control policy and related Presidential decisions as discussed in the Arms Control Policy section of the ACIS.

The modernization of the B-52, the procurement of the B-1B, the deployment of air-launched cruise missiles, and the development of advanced aircraft technologies contribute to the continued viability of the bomber element of the Strategic Triad. This modernization of the airborne element of US strategic forces is essential to maintain the viability of the US Strategic Triad in light of the massive Soviet military investment in new generation strategic systems and defenses. This should, in turn, create incentives for the Soviets to respond seriously to proposals for equitable and verifiable reductions in arms.

The airborne element of US strategic forces possesses advantages which are not offered by other legs of the Triad. Owing to their flexibility, manned bombers have the potential to seek out and hold at risk mobile, relocatable or imprecisely located targets, including such high value Soviet assets as command and control facilities and mobile ballistic missiles. Since they are recallable, they also can respond to ambiguous tactical warning of Soviet attack. Finally, their long time

of flight, when compared with ballistic missiles, and their ability to be recalled after launch and to survive a surprise first strike make manned bombers a stabilizing factor in the strategic balance.

B. Relation to Arms Control Agreements.

The treaties and arms control agreements referred to in this section are provided in greater detail in the Treaty appendix to this ACIS.

1. SALT II Treaty.

The provisions of the SALT II Treaty include a 1320 limit on the combined total of launchers of MIRVed (multiple independently targetable reentry vehicle) strategic ballistic missiles, MIRVed air-to-surface ballistic missiles (ASBMs), and heavy bombers equipped with cruise missiles capable of a range in excess of 600km. Of this total of 1320, no more than 1200 could be launchers of MIRVed ballistic missiles and ASBMs. This allows deployment of 120 heavy bombers equipped with cruise missiles capable of ranges greater than 600km, without any offsetting reductions in launchers of MIRVed ballistic missiles and ASBMs. Under the terms of the Treaty, a larger number of aircraft equipped with long-range cruise missile launchers and ASBMs could be deployed if fewer than 1200 MIRVed ballistic missile launchers and ASBMs were deployed.

Further, under the provisions of the SALT II Treaty, any deployment of aircraft equipped for ALCMs capable of a range in excess of 500km would be counted against the SALT II strategic nuclear delivery vehicle limits, as well as against the sublimits on launchers for MIRVed missiles and on heavy bombers equipped for cruise missiles. These limitations apply to all weapon-delivery (nuclear or conventional) ALCMs capable of ranges in excess of 600km. According to the Second Agreed Statement to Paragraph 14, Article IV, of the SALT II Treaty, during the term of the Treaty no bomber of the B-52 or B-1 types and no bomber of the Tu-95 or Myasishchev types would be equipped for more than twenty cruise missiles capable of a range in excess of 600km.

The Airborne Strategic Offensive Systems analyzed herein comply with existing obligations of the SALT II Treaty as set forth in the Interim Restraint decision, discussed in the Arms Control Policy section of this ACIS. In FY 1987 the modernization of B-52's could bring into play the possible applicability of SALT II limits described above. This issue will be addressed at the appropriate time. In the meantime,

the US is preserving the programmatic flexibility required to comply with treaty limits and to carry out its strategic policy.

2. Threshold Test Ban Treaty (TTBT).

The TTBT prohibits individual underground nuclear explosions above 150 kilotons. [deleted] US testing is carried out in compliance with the 1963 Limited Test Ban Treaty.

C. Effect on Current and Prospective Negotiations.

The Airborne Strategic Offensive System modernization programs are judged to have a positive effect in the strategic offensive arms forum of the Nuclear and Space Talks (NST) in Geneva. As discussed previously in the Arms Control Policy section, the keys to accomplishing US arms control policy goals are a more equitable military balance and enhanced deterrence through modernization of US strategic forces -- particularly those forces that are intrinsically stabilizing. This strategic force modernization should also create incentives for the Soviets to respond seriously to the US proposals for equitable and effectively verifiable reductions in arms that are put forth in the NST.

D. Verifiability.

The US policy on the verifiability of arms control agreements is summarized in the Arms Control Policy section of this ACIS.

Cruise missiles represent a class of weapons that raises complex and difficult verification problems. As cruise missile programs and technology mature, these verification problems will increase. In contrast with US efforts to monitor Soviet cruise missile programs, the open US society affords the Soviets considerable advantages in monitoring ALCM development, production, and deployment. Still, each side would have to overcome difficult problems in order to be able to confidently determine range and payload. To the degree that such elements are or become the subject of constraints under arms control agreements, verification would become more difficult.

In the SALT II Treaty, the problem of verification of ALCM limits was to be addressed through the use of Externally Observable Differences (EODs) and Functionally Related Observable Differences (FRODs), and counting rules on heavy bombers equipped for cruise missiles. Similar methods could be used in the future, possibly augmented by cooperative measures.

Some testing of ALCMs on launch capable aircraft would be necessary before they could be deployed confidently, thereby allowing opportunities for identifying cruise missile launch capable aircraft. These judgments are based on the assumption that [deleted].

V. SUMMARY AND OVERALL ARMS CONTROL ASSESSMENT

In the face of improving and unconstrained Soviet air defenses, and the age of the bulk of our strategic bomber force, the continued modernization of the B-52, procurement of ALCMs and the B-1B, and pursuit of advanced technologies for bomber applications, are necessary to maintain the effectiveness of the strategic bomber force. The programs described in this analysis will improve US retaliatory capabilities and thus strengthen deterrence, enhance crisis stability, and create incentives necessary for the Soviets to respond seriously to US proposals for meaningful strategic arms reductions.

Programs to ensure the continued effectiveness of the airborne strategic offensive force support US arms control and national security goals of deterring war and preventing coercion while maintaining international stability. These programs contribute to the effectiveness of the air-breathing element of the strategic Triad and are consistent with US arms control objectives.

ARMS CONTROL IMPACT ANALYSIS

ICBM PROGRAMS

I. INTRODUCTION

This arms control impact analysis addresses the following DoD and DoE programs:

<u>PE Number</u>	<u>Program Title</u>
11213F	MINUTEMAN Squadrons
11215F	PEACEKEEPER Squadrons
64312F	ICBM Modernization and Associated Procurement
DoE	W87 PEACEKEEPER Warhead
DoE	Small ICBM (SICBM) Warhead
63311F	Advanced Strategic Missile Systems (ASMS)

These programs are analyzed together because each contributes to the continued effectiveness of the land-based ICBM element of the US Strategic Triad; consequently, their arms control implications are likely to be similar. Analysis of these major programs in concert is necessary to gain a full understanding of their arms control implications and to reflect their contribution to deterrence.

II. PROGRAM DESCRIPTIONS

Detailed information on the following DoD programs is contained in Supporting Data for Fiscal Year 1987 Budget Estimates, Descriptive Summaries, a classified document published by the Department of the Air Force and submitted to the Congress. Also, additional information on these programs can be found in the FY 1986 Arms Control Impact Statement for ICBM Programs.

A. MINUTEMAN Squadrons (PE 11213F).

The MINUTEMAN is projected to maintain its role as a prime nuclear deterrent force for the United States into the next century. This program element provides improvements and modifications to the MINUTEMAN force to enhance its contribution to deterrence. The FY 1987 program would conduct guidance studies for accuracy improvement, re-entry vehicle studies to refine required penetration aids characteristics, and take penetration aid components developed in the Advanced Strategic Missile Systems program and adapt or integrate them for use on MINUTEMAN III.

B. ICBM Modernization (PE 64312F), PEACEKEEPER Squadrons (PE 11215F), and Associated Procurement.

The ICBM modernization program is built on the recognition, stated by the Scowcroft Commission in April 1983, that all ICBM tasks cannot be served by a single missile or basing mode. To address these differing requirements and to insure flexibility in responding to Soviet actions, this program consists of three elements: deployment of 50 PEACEKEEPER missiles in existing MINUTEMAN silos; investigation of a more survivable basing mode for the second 50 PEACEKEEPERS; development of a small single-warhead ICBM, and development of alternate basing technologies.

1. PEACEKEEPER.

Deployment of 50 PEACEKEEPER missiles, (an advanced, Multiple Independently-Targetable Re-entry Vehicle (MIRV) ICBM), in existing silos is the near-term response to reduce the Soviet advantage in ICBM capability. Additionally, more survivable basing modes are being investigated. The PEACEKEEPER will complete five advanced RDT&E flights in FY 1986. Initial operational capability would be achieved in December 1986 with the deployment of 10 missiles in Wyoming. The deployment of the remaining 40 missiles of the first increment would occur in 1987-1988. A deployment plan for the second 50 PEACEKEEPER missiles will be developed upon selection of a survivable basing mode.

2. Small ICBM and Survivable Basing.

Deployment of a small single-warhead ICBM in one or several basing modes, is part of the longer-term response to Soviet actions. The emphasis in the current research and development program--as mandated by Congress--has been on mobility. A survivable small ICBM could enhance the deterrent

effectiveness of our land-based missile force over the long term and, with a single re-entry vehicle, would present a relatively low-value target compared to a large MIRVed missile. Analyses and tests will continue during FY 1986 to further narrow Small ICBM (SICBM) concepts and baseline functional requirements in a weapon system specification. Full-scale development of the SICBM is scheduled to begin in FY 1987. Flight tests could begin in 1989, leading to an IOC in 1992. (The US proposal to ban mobile ICBMs is addressed later in this analysis.)

3. ICBM Follow-on Basing Technologies.

Development of silo hardening technology, applicable both to the PEACEKEEPER missile system and small single-warhead ICBM could provide greater diversification and survivability for US ICBM forces. Deep basing would also enhance the survivability of the US ICBM force. The FY 1986 hard silo test program features a high explosive subsize blast test on a scaled-down silo to validate procedures to be used in the full-size test for the hard silo in FY 1987.

C. W87 PEACEKEEPER Warhead (DoE).

Each PEACEKEEPER will deliver a payload of up to 10 MK-21 re-entry vehicles with a W87 warhead mated to each MK-21 re-entry vehicle. The W87 warheads are currently planned with a [deleted] yield and will incorporate enhanced safety features for incorporation in the PEACEKEEPER system. [deleted]

D. Small ICBM (SICBM) Warhead (DoE).

The Small ICBM feasibility study calls for a [deleted]. The warhead yield for the SICBM has not been decided. The SICBM warhead program will continue in feasibility study and design definition during FY 1986 and FY 1987.

E. Advanced Strategic Missile Systems (ASMS) (PE63311F).

This is a continuing program that conducts advanced development of key ballistic missile, re-entry, and basing systems/subsystems to maintain effectiveness in the ICBM force. The FY 1986 program continued advanced development of the Penetration Aids Deployment System (PADS) for PEACEKEEPER

and MINUTEMAN III. It also provided for fabrication and ground testing of advanced nosetip candidates for the Severe Environment Nosetip Test (SENT) program and provided for aircraft captive carry flight tests of Maneuvering Re-entry Vehicle (MaRV) advanced guidance subsystem components and sensors. The FY 1987 program calls for final flight testing of the integrated PADS on a PEACEKEEPER missile, SENT flight testing, and aircraft captive carry flight testing of MaRV advanced guidance concepts.

III. SYSTEM DESCRIPTION

A. US Intercontinental Ballistic Missile (ICBM) Programs.

The program elements described above constitute the modernization of the ICBM elements of US strategic forces to redress the destabilizing asymmetry in ICBMs between US and Soviet strategic forces. The ICBM force, with its intrinsic qualities of promptness, rapid retargeting, relatively low day-to-day operating costs, and nearly 100 percent alert rate, complements the other two elements of the US Strategic Triad and possesses unique attributes that neither of the other elements (air-breathing systems and submarine-launched ballistic missiles) alone possesses.

The current US ICBM force consists of MINUTEMAN III, MINUTEMAN II, and a few TITAN II missiles. There are 550 MIRVed MINUTEMAN III missiles, 300 of which are armed with the MK 12A re-entry vehicle and the W78 warhead, while the remaining 250 carry the MK 12 re-entry vehicle and the W62 warhead. In addition, there are 450 single-RV MINUTEMAN II missiles equipped with the MK 11C re-entry vehicle and the W56 warhead. A few single-RV TITAN II missiles, equipped with the MK 6 re-entry vehicle and the W53 warhead, remain in the inventory. They are being phased out, with the last missile scheduled to be retired in 1987.

The planned modernization of the ICBM force will consist of 50 PEACEKEEPER missiles, which will replace MINUTEMAN III missiles on a one-for-one basis. The PEACEKEEPER's initial operational capability will be in December 1986. The missile will carry the MK 21 re-entry vehicle and the W87 warhead. An additional 50 PEACEKEEPERS will be requested from the Congress when a more survivable basing mode has been selected. Developmental work is underway for the Small ICBM (SICBM). Numbers of deployed missiles, their configuration and basing mode have not been decided.

B. USSR ICBM Programs*

The predominant system of the Soviet strategic nuclear forces is the land-based ICBM. As presently constituted, the operational Soviet ICBM force consists of some 1400 missiles in silos and on mobile launchers (818 of which are hardened silos capable of launching fourth generation MIRVed ICBMs) equipped with up to [deleted]. The most accurate of these are capable of destroying hardened targets. The Soviets have achieved a significant increase in the capability of this force through a continuing program of modernization resulting in the deployment of fourth, and now fifth, generation ICBMs. In addition, the Soviets have sought to limit damage to their warfighting capability by hardening ICBM silos and recently by deploying a mobile system, the SS-25.

Soviet research and development on ICBMs is a dynamic and ongoing process. A follow-on to the SS-18 liquid propellant heavy MIRVed ICBM is nearing the flight test stage of development. [deleted] A new, solid-propellant ICBM, the medium-size SS-X-24, is well along in its flight test program. A rail-mobile version of this system will probably be deployed beginning in 1987. The SS-25, which was recently deployed, has been designed as a road-mobile system and has an inherent refire capability. The SS-25 is a second new ICBM and violates the Soviet political commitment to abide by the provisions of SALT II. Given the large land area and general lack of public accountability within the Soviet Union, both mobile-based systems could achieve wide dispersion and prove to be extremely elusive targets. Additionally, a new solid-propellant missile that may be in the same class as the SS-X-24 and may have better accuracy and greater throw-weight is projected to begin flight testing in the next few years.

There is little doubt that the overall pace and scope of Soviet ICBM programs does in fact pose a serious threat to the survivability of the current US silo-based ICBMs.

* See also Soviet Military Power, 1985 (4th edition), United States Military Posture FY 1986 (OJCS), and [deleted].

IV. ANALYSIS

A. Consistency with US Arms Control Policy and Related Presidential Decisions.

The program elements reviewed in this analysis are consistent with US arms control policy and related Presidential decisions as discussed in the Arms Control Policy section of the ACIS.

The modernization of MINUTEMAN Squadrons, the procurement of PEACEKEEPER, and the development of the Small ICBM, ICBM Follow-on Basing Technologies, and Advanced Strategic Missile Systems Technologies contribute to the continued effectiveness of the ICBM element of the Strategic Triad and thus improve strategic stability and enhance the security of the US and its allies. This modernization of the ICBM element of US strategic forces is essential to correct imbalances created by prior unilateral US restraint and by the massive Soviet military investment in new generation strategic systems and defenses. This should, in turn, create incentives for the Soviets to respond seriously to proposals for equitable and verifiable reductions in arms.

The ICBM element of US strategic forces possesses qualities which are not offered alone by other legs of the Triad. The inherent high alert rates, rapid retargeting, and responsiveness of the ICBM force provide a powerful deterrent to a Soviet first strike. The deployment of PEACEKEEPER in MINUTEMAN silos will help close the gap in prompt hard-target kill capability and will force the Soviet leadership to weigh more seriously the vulnerability of key elements of their own forces to retaliation. PEACEKEEPER will thereby help to induce caution and restraint into any perception Soviet leadership might have about its ability to dominate a crisis or to conduct and emerge successfully from a nuclear conflict with its most valued assets intact and its war aims achieved. At the same time, the planned deployment of 100 PEACEKEEPER missiles does not give the Soviets legitimate grounds for fearing a US first strike. US strategic forces will still fall far short of possessing a first-strike capability, given the numbers of the hardened military assets and the dispersal of Soviet nuclear forces.

Development of the Small ICBM will provide long-term survivability and reduce incentives for a pre-emptive attack. With a single RV, a small ICBM would present a lower-value target compared to a large MIRVed missile. Properly based, the Small ICBM will decrease Soviet confidence in successful

pre-emptive strikes through either individual or barrage attacks against these assets. Stability and deterrence will be enhanced to the extent that the Soviet Union will recognize that any nuclear attack would not destroy the US forces and C³ necessary for us to respond effectively against both remaining Soviet nuclear capabilities and against the Soviet conventional forces necessary to consolidate any lasting military, political, or economic gain from a pre-emptive nuclear strike. Likewise, the development of hardening technologies and deep basing techniques applicable to both the PEACEKEEPER and Small ICBM could provide greater survivability of the ICBM force, enhancing its deterrent value and having a positive influence on global stability.

In the current negotiations with the Soviet Union, the US has proposed a ban on mobile ICBMs given the increasing difficulty posed in verifying the numbers and status of such missiles. Continued investigation of mobile basing modes is necessary to provide the Soviet Union an incentive to negotiate seriously about mobile ICBMs and as a prudent hedge in case a negotiated ban on mobile ICBMs is not obtainable. In helping prevent a deteriorating strategic balance, and in reducing a critical asymmetry in relative capabilities, the US ICBM programs will enhance stability and furnish a stronger foundation for equitable and verifiable arms reduction.

B. Relation to Arms Control Agreements.

The treaties and arms control agreements referred to in this section are provided in greater detail in the Treaty appendix to this ACIS.

1. SALT I Interim Agreement

SALT I permitted modernization and replacement of strategic ballistic missile systems. It precluded the construction of new fixed, land-based ICBM launchers and limited to 10-15 percent any increase in silo dimensions, but it did not limit the development of new missiles for either fixed or mobile launchers. The development of PEACEKEEPER and the Small ICBM, and prospective improvements for MINUTEMAN, are consistent with the provisions of the Interim Agreement.

2. SALT II Treaty.

The provisions of the SALT II Treaty included a launcher limit of no more than 1200 launchers of MIRVed ballistic missiles with a sub-limit of 820 for launchers of MIRVed ICBMs. The deployment of the PEACEKEEPER will not

make the US exceed the launcher limits since it will be deployed in existing MIRV-accountable silos. Deployment of the Small ICBM with a single RV could also be achieved within the Treaty limits for strategic nuclear delivery vehicles.

The SALT II Treaty also includes a provision which prohibits flight-testing or deployment of a new ICBM with more than 10 RVs. The planned configuration of ten MK-21 RVs per PEACEKEEPER is consistent with this provision.

The "new types" provision of the SALT II Treaty limits each side to flight-testing and deployment of only one new type of ICBM for the duration of the Treaty. Had this treaty been ratified, it would have remained in force through December 31, 1985. Under our new interim restraint policy which was announced by President Reagan on June 10, 1985, the US reserves the right to respond to Soviet noncompliance, including the development of the SS-25, their second new type of ICBM. The small ICBM, which is scheduled to be flight-tested in FY 1989, is particularly relevant in this regard.

Except with respect to the one "new type" of ICBM that is permitted, Article IV prohibits the flight-testing or deployment of ICBMs which are different from those ICBMs flight-tested as of May 1, 1979, in the following respects:

- the number of stages;
- the length, the largest diameter, the launch-weight, or the throw-weight of the missile (but variations of up to 5 percent are permitted with respect to these measures); and
- the type of propellant (that is, solid or liquid) of any of its stages.

None of the planned modifications of MINUTEMAN II or III would be affected by any of these limitations.

The SALT II Treaty also provides that in the process of modernization and replacement of ICBM silo launchers, the original internal volume of an ICBM silo launcher will not be increased by more than 32 percent. Placement of PEACEKEEPERS in MINUTEMAN silos will not violate this provision.

3. Threshold Test Ban Treaty (TTBT).

The TTBT prohibits individual underground nuclear explosions above 150 kT. [deleted]

[deleted]

C. Effect on Current and Prospective Negotiations.

The ICBM programs are judged to have a positive effect in the strategic offensive arms forum of the Nuclear and Space Talks (NST) in Geneva. As stated previously in the Arms Control Policy section, in order to accomplish its arms control policy goals, the US is working toward a more stable military balance and enhanced deterrence through modernization of its strategic forces. This is particularly true in the case of ICBMs where the asymmetry between US and Soviet strategic forces remains very much in their favor. The prosecution of the ICBM programs influences the Soviet leadership's perception of our national will, purpose, and strength and is closely related to our chances of negotiating deep and effectively verifiable reductions in arms at the NST in Geneva.

D. Verifiability.

US policy on the verifiability of arms control agreements is summarized in the Arms Control Policy section of this ACIS.

Verification of numerical limits on mobile ICBMs will be an exceedingly difficult problem because of their mobility. [deleted]

[deleted]

[deleted] Due to the serious consequences for our national security of Soviet cheating on a mobile missile ceiling, [deleted] the US has proposed a ban on mobile ICBMs.

A US mobile system is likely to face many more restrictions than the mobile Soviet systems. Possible deployment limitations on a US mobile system include limits on the total numbers of missiles and available operating area as well as those caused by public interface concerns. These factors, along with the open nature of US society will afford the Soviets a considerable advantage in the monitoring of mobile ICBMs. They will find verifying data from NTM with other sources much easier than will the US.

V. SUMMARY AND OVERALL ARMS CONTROL ASSESSMENT

In the face of the continuing qualitative and quantitative build-up of Soviet strategic nuclear forces, deployment of the PEACEKEEPER, development of the Small ICBM and follow-on basing technologies, and upgrade of the MINUTEMAN force are necessary to maintain the deterrent contribution of the ICBM leg of the Triad.

PEACEKEEPER deployment reflects a recognition that strategic imbalances are destabilizing and serve to undermine deterrence. With its prompt, hard-target kill capability, PEACEKEEPER will redress the Soviet advantage in this area and place at risk even the hardest Soviet fixed targets. Development of a small ICBM and follow-on basing technologies will provide the means to increase the survivability of US ICBM forces and decrease the temptation for a pre-emptive attack. Deployment of PEACEKEEPER, in limited numbers, beginning in 1986, will pose no serious first-strike threat to Soviet strategic forces.

In combination, the programs addressed in this analysis will maintain and modernize the US ICBM force's retaliatory capabilities and thus strengthen deterrence, enhance crisis stability, and create incentives for the Soviets to respond seriously to US initiatives for meaningful strategic arms reductions. These programs are consistent with all existing arms control agreements.

ARMS CONTROL IMPACT ANALYSIS

SSBN/SLBM PROGRAMS

I. INTRODUCTION

This arms control impact analysis addresses the following DoD and DoE programs:

<u>PE Number</u>	<u>Program Title</u>
11221N	Fleet Ballistic Missile System
11224N	SSBN Security Program
11228N	TRIDENT Submarine, TRIDENT I Missile and Associated Procurement
64363N	TRIDENT II Missile (D-5) and Associated Procurement
Procurement	UGM-96A (C-4) TRIDENT I
Procurement	UGM-73A (C-3) POSEIDON
DoE	W76 TRIDENT I Warhead
DoE	W88 TRIDENT II Warhead
11402N	Navy Strategic Communications
11401N	Extremely Low Frequency (ELF) Communications and Associated Procurement
Procurement	E-6A (TACAMO)

The preceding programs are aggregated not only because they meet statutory requirements, but also because they form the sea-based component of the US Strategic Triad, and as such, are best analyzed for their arms control impact as part of that system.

II. PROGRAM DESCRIPTIONS

Detailed information on the following DoD programs is contained in Supporting Data for Fiscal year 1987 Estimates, Descriptive Summaries. This classified document is published

by the Navy and submitted to the Congress. The FY 1986 ACIS also contains extensive data on the SSBN/GLBM programs.

A. Fleet Ballistic Missile System (PE 11221N).

This program contains three subprojects aimed at extending the effectiveness and survivability of current and future SSBN systems. The three subprojects are:

1. Fleet Ballistic Missile Systems (FBMS).

This subproject focuses on assessing and improving the Fleet Ballistic Missile System and has the objective of extending the effectiveness and survivability of this vital strategic weapon system. The FY 1986 program continues the FBM vulnerability and effectiveness studies to decrease potential vulnerabilities, continues integration of the NAVSTAR GPS receiver into the FBM navigation subsystem, continues development of the TRIDENT Sonar Operational Trainer and develops the design for the TRIDENT Command and Control System Evaluation Program (CCSEP). FY 1987 would see continuation of these efforts.

2. SSBN Unique Sonar.

The purpose of SSBN unique sonars is to evaluate and improve the sonars carried by the pre-TRIDENT SSBNs. The FY 1986 program continues the sonar vulnerability and effectiveness studies against the current and anticipated threats, and continues correction of outstanding deficiencies of the AN/BOO-9 sonar system identified by Operational Evaluation. FY 1987 would see continuation of the vulnerability and effectiveness studies.

3. Submarine Countermeasures Development.

This subproject is designed to maintain the survivability of the SSBN/SLBM system against an expanding threat by improving the capabilities of an SSBN to detect and counter a threat. The FY 1986 program continues the development, testing, and evaluation of a wide range of acoustic sensors, processors, and countermeasure devices. FY 1987 would see the program continued.

B. SSBN Security Program (PE 11224N).

The SSBN Security program proposes to maintain or enhance the qualitative lead in SSBN covert mobility in the face of expanding Soviet ASW capabilities including those

involving advanced technologies. The project identifies existing and potential threats, analyzes those threats, and develops countermeasures to those threats. The US Navy is investigating and analyzing submarine-caused phenomena and submarine operational tactics. Tactical exercises will continue to be used to verify experimental data. The FY 1986 program concentrates on the acoustic and non-acoustic detectability of the SSBN force. FY 1987 would see continuation of this development.

C. TRIDENT Submarine, TRIDENT I Missile (11228N) and Associated Procurement.

The TRIDENT I project is a long-term developmental project designed to supplement and replace the older POLARIS/POSEIDON SSBN systems. Twelve POSEIDON Class SSBNs and the OHIO Class TRIDENT submarine carry the TRIDENT I (C-4) missile.

The OHIO Class submarine provides a survivable strategic deterrent with improved resistance to an advanced ASW environment. It is highly reliable and maintainable, requires minimal manning, and is deployed from continental bases. The FY 1987 program procures the fourteenth TRIDENT submarine. The MIRVed TRIDENT I (C-4) missile has a maximum full payload range of [deleted]. The FY 1986 program continues the evaluation of ships' systems and testing. FY 1987 would see continuation of this work.

D. TRIDENT II Missile (D-5) (PE 64363N) and Associated Procurement.

The TRIDENT II (D-5) system will enhance SSBN deterrent value by increasing the full payload which may be launched at maximum range. The missile will provide a hard target kill capability to the SLBM force. The FY 1987 program contains funds for two subprojects:

1. TRIDENT II Missile.

The FY 1987 budget proposes procurement of [deleted] missiles and associated equipment on existing operational development contracts. The TRIDENT II (D-5) will deploy aboard the ninth and subsequent OHIO Class TRIDENT submarines and will be backfitted in the first eight OHIO Class submarines during the first depot level availability. The missile provides greater payload, yield and improved accuracy to cover a broader target spectrum including hard targets. Initial Operational Capability (IOC) is planned for December 1989. The FY 1986 program continued fabrication, assembly and

testing in preparation for FY 1987 flight tests, testing of major subsystems including the MK5 re-entry vehicle and MK6 guidance systems, and shorebased missile facility construction. Full scale tests of complete missile systems and submarine interfaces are scheduled.

2. TRIDENT Submarine.

This subproject supports the changes in the baseline TRIDENT submarine program to accommodate the D-5 missile system commencing with the ninth TRIDENT hull. During FY 1986 there will be continued test and evaluation of equipment installation at test sites and development of weapon support system interfaces and components. Development and testing of weapon support systems to support integration of the D-5 missile with the OHIO Class submarine will continue in FY 1987.

E. UGM-96A (C-4) TRIDENT I (Procurement).

The TRIDENT I (C-4) missile is an extended range MIRVed weapon. Compared to the older POSEIDON (C-3), it provides greater patrol ranges and increased SSBN security against improving Soviet ASW capabilities. The TRIDENT I is deployed aboard 12 POSEIDON submarines and will be placed in the first eight TRIDENT submarines until they are backfitted with TRIDENT II (D-5) missiles.

In FY 1987, the program would continue the funding for flight test instrumentation and re-entry system components. The flight test program is required in order to maintain high confidence in the reliability of the deployed TRIDENT I force.

F. UGM-73A (C-3) POSEIDON (Procurement).

POSEIDON FY 1987 procurement will fund flight test instrumentation and re-entry system components for the C-3 missile. The flight test program is necessary to maintain the C-3 missile as a credible deterrent force.

G. UGM-73A (C-3) POSEIDON Missile Modification (Procurement).

To ensure the POSEIDON missile system remains a reliable weapon, the FY 1987 budget would fund modifications to correct known deficiencies, and replace parts no longer in production, or subassemblies of such parts. FY 1987 would also see funding for modifications of thrust motors and post boost controls.

H. W76 TRIDENT I (DoE).

FY 1987 funding would procure [deleted] warheads for the MK 4 re-entry vehicles.

I. Navy Strategic Communications (PE 11402N).

Four subprojects make up the Strategic Communications program: TACAMO, Shore-to-Ship Communications System, Survivable and Enduring Communications and ECX (E-6A). The Strategic Communications program is designed to ensure reliable, survivable and secure communications to SSBN and other forces involved in Single Integrated Operational Plan operations before, during and after a nuclear attack.

1. TACAMO.

This project provides airborne communication equipment for a survivable link for SSBN submarine Command, Control, and Communication (C³). Equipment developed under this project is used on the current EC-130 TACAMO and future E-6A (ECX) TACAMO aircraft. FY 1986 continued both advanced and full scale development of VLF transmitters, receivers, antenna, and processors and satellite interfaces. FY 1987 will see continued development, procurement and flight testing of the TACAMO communication system.

2. E-6A (ECX).

As replacement for EC-130, the ECX uses the E-3 derivative of the Boeing 707 to accommodate growth in the TACAMO communication system. The ECX will provide improved survivability, increased endurance, Electromagnetic Pulse (EMP) hardening, and will minimize ground support requirements. For FY 1986, the Navy plans to procure two aircraft, complete subsystem testing, and begin integration of the ECX airframe with TACAMO communication equipment. In FY 1987, two more aircraft will be procured and contractor tests begun.

3. Survivable and Enduring Communications (SEC).

SEC will provide for reconstitution of communication with Fleet Ballistic Missile submarines when other strategic communication assets are no longer available. This project was previously contained in project X1083, Shore-to-Ship Communications. The FY 1986 program continued full scale development of the Free Floating Balloon relay, the shore transportable node, a network analysis, and a reconstitutable ELF concept demonstration.

4. Shore-to-Ship Communications Systems.

This project contains the following subprojects designed to improve shore-to-ship communications with SSBN submarines: VERDIN (Shipboard Very Low Frequency (VLF) receiving system), a fixed VLF (shore-based) transmitter system, the POSEIDON Communication Improvement Program, and POSEIDON Integrated Submarine Communications Antenna Systems. The FY 1987 program would complete development of a VERDIN receiver terminal.

J. Extremely Low Frequency (ELF) Communications and Associated Procurement (PE 11401N).

A two-site, synchronously operated Extremely Low Frequency (ELF) strategic communication system is an important submarine C³ requirement. Current VLF communication systems require submarines to operate near the surface at restricted speeds and depth in order to obtain reliable communications. The ELF system allows submarines to remain in constant contact while maneuvering at speeds and depths beyond VLF reception capability. Enlarging the area from which SSBNs can obtain reliable communications decreases submarine detection probabilities and hedges against possible future advances in Soviet ASW technology.

The system consists of a 56-mile antenna and related facilities located near K. I. Sawyer AFB, Michigan, and a 28-mile antenna and related facilities near Clam Lake, Wisconsin.

Plans for FY 1987 include completion of full scale development at the Michigan transmitter site. Full operational capability is scheduled for FY 1988.

K. E-6A TACAMO (Procurement).

The procurement program would buy two more E-6A aircraft for FY 1987 and initial spares. TACAMO is addressed under Navy Strategic Communications (PE 11402N).

III. SYSTEM DESCRIPTION

A. US Sea-based Strategic Missile Forces.

As a part of the Strategic Modernization Program the sea-based leg of the Triad is undergoing steady modernization. The POLARIS system has been retired. The POSEIDON system will be phased out of active service in the mid 1990s.

The TRIDENT I missile was introduced in 1979 and TRIDENT II will become operational in 1989. The TRIDENT SSBN program seeks to maintain the deterrent capabilities of the US submarine force.

A credible SSBN/SLBM force provides an effective means of retaliation, responsive to the National Command Authorities (NCA). The NCA must be able to choose among many strike options, communicate those decisions to the SSBN/SLBM force, and be confident that the force is able to execute those orders. The C³ improvements described above are responsive to that need.

The SSBN/SLBM leg of the Triad is the most survivable leg. The high survivability of submarine-based nuclear forces denies any potential aggressor the ability to launch a pre-emptive strike without fear of suffering crippling damage in return. The overall improvements under the TRIDENT I and II missile programs offer qualitative improvements in terms of range, payload, and accuracy over older POSEIDON systems. In terms of military capability, the D-5 equipped submarine force will have the ability to destroy hardened targets, thus giving the NCA additional retaliatory flexibility.

Strategic force C³ is of paramount importance not only in carrying out operational directives, but also in maintaining redundant controls in peacetime. ELF/TACAMO programs are key elements in this redundant communication network that provides secure and reliable communications with SSBN submarines.

B. Soviet Sea-based Strategic Forces.

The Soviet Union views its sea-based strategic forces as a key element in providing the force balance necessary to meet Soviet goals in any postwar scenario, especially in any poststrike scenario.

From the early days of diesel-powered GOLF Class submarines armed with three short-range, surface launched missiles, the Soviets have steadily upgraded their weapons systems. The latest strategic systems incorporate MIRVed missiles: the [deleted] SS-N-20 SLBM into the TYPHOON Class, the largest submarine in the world and the [deleted] SS-NX-23 on the DELTA IV Class. Other upgrades, [deleted], make the Soviet SSBN force a formidable one.

The bulk of the Soviet SSBN force is made up of the YANKEE and DELTA classes. As of November 1985, the Soviets had [deleted] YANKEE I SSBNs in the strategic inventory, each capable of carrying [deleted] SS-N-6 missiles with ranges up to [deleted]; [deleted] YANKEE II carrying [deleted] SS-N-17 missiles with ranges up to [deleted]; [deleted] DELTA I and [deleted] DELTA II carrying [deleted] SS-N-8 missiles respectively, each with a range up to [deleted]; the [deleted] DELTA IIIs each carrying [deleted] of the MIRVed SS-N-18 with ranges up to [deleted]. Thus, with these long-range missiles, most modern Soviet SSBNs can now operate in Arctic waters adjacent to the Soviet homeland and be within firing range of continental US targets, even while in port.

Although Soviet SSBN forces carry a smaller percentage of the total number of Soviet warheads as compared to the US force structure, it is clear that Soviet SSBNs pose a significant strategic threat in which the Soviets have invested vast resources.

IV. ANALYSIS

A. Consistency with Arms Control Policy and Related Presidential Decisions.

As stated earlier in the arms control policy section, the US seeks deep and verifiable reductions in all types of offensive arms with particular focus on the more destabilizing systems.

The continuing modernization of the SSBN Force will enhance overall stability, especially with the introduction of the complete TRIDENT system. The Scowcroft Commission Report of 1983 observed that, "(The TRIDENT submarine . . . and D-5 missile) will add importantly to the already high degree of survivability of the ballistic missile submarine force. Given the increased importance of that force, both programs (TRIDENT SSBN and D-5 missile) are essential."

If deep force level reductions are achieved it is even more vital to maintain the stability provided by this highly survivable leg of the Triad through modernization. The advent of reduced SSBN/SLBM force levels resulting from potential agreements only increases the importance of these forces and the need for continuing improvement. Consistency with the President's decision to comply with SALT limitations is discussed below.

B. Relation to Arms Control Treaties and Agreements.

The treaties and arms control agreements referred to in this section are provided in greater detail in the Treaty appendix to this ACIS.

1. SALT I Interim Agreement.

The SALT I Interim Agreement limited the SLBM force of the US to 710 SLBM launchers and 44 SSBNs.* The deactivation of the USS SAM RAYBURN (SSBN 635) was used as partial compensation for the new TRIDENT SSBN, USS ALASKA, to keep the United States under these limits.

The Soviets have dismantled and removed [deleted] older YANKEE Class units from SALT accountability; [deleted]. In contrast, of the ten US POLARIS SSBNs constructed, eight have been dismantled and the remaining two have been converted to non-strategic mission submarines. However, these latter two ex-POLARIS submarines remain SALT I-accountable. They are scheduled for deactivation in 1992. The Navy maintains the option to overhaul POSEIDON SSBNs as they reach scheduled overhaul dates or dismantle them to meet arms control limits. See Soviet Military Power for a detailed comparison of US-Soviet SSBN force levels.

2. SALT II Treaty

SALT II limits the total number of MIRVed ballistic missile launchers to 1200. The deactivation of the USS RAYBURN will keep the US below this limit until the sea-trials of the next TRIDENT SSBN. Decisions on future compliance options will be made at the appropriate time. In the meantime, the US is preserving the programmatic flexibility required to comply with treaty limits and to carry out its strategic policy.

3. Threshold Test Ban Treaty (TTBT).

The unratified Threshold Test Ban Treaty prohibits tests of nuclear weapons with yields over 150 kT. [deleted]

* See Treaty Annex for details on limitations contained in the SALT I Interim Agreement Protocol.

[deleted] Testing is, of course, carried out in compliance with the 1963 Limited Test Ban Treaty.

C. Effect on Current and Prospective Negotiations.

The SSBN/SLBM modernization programs are judged to have a positive effect in the strategic offensive arms forum of the Nuclear and Space Talks (NST) in Geneva. As discussed previously in the Arms Control Policy section, the keys to accomplishing US arms control policy goals are a more equitable military balance, and enhanced deterrence and stability through modernization of US strategic forces -- particularly those forces, such as SSBN/SLBM, that are highly survivable. This strategic force modernization should also create incentives for the Soviets to respond seriously to the US proposals for equitable and effectively verifiable reductions in arms that are put forth in the NST.

D. Verifiability.

For arms control purposes, SSBN/SLBMs are counted when the submarines commence sea trials. Although SSBNs and their SLBM launchers are concealed for a part of their life and deployment cycles, [deleted]. The numbers of strategic submarines and SLBM launchers can thus be monitored by NTM and, therefore, do not cause verification problems. [deleted]

V. SUMMARY

The TRIDENT and POSEIDON submarine and missile systems should sustain for the foreseeable future the already high survivability of the US ballistic missile submarine force. The range of the TRIDENT I and II missiles will make available to US strategic submarines far more ocean operating area than is available to SSBNs with POSEIDON SLBMs, and should complicate Soviet ASW efforts. The high survivability of TRIDENT submarines is further enhanced by the improvement in the quietness of their operations and continued improvements resulting from the SSBN security program.

As currently planned, the introduction of TRIDENT submarines begun in FY 1981 will result in an increase in the numbers of strategic sea-based ballistic missile warheads [deleted].* The modernization of the US sea-based strategic forces is consistent with the US policy of restoring the strategic balance, enhancing stability through survivability, and creating incentives for the Soviets to enter into meaningful negotiations for arms reductions treaties.

* Projection does not reflect impact of strategic arms control agreements.

ARMS CONTROL IMPACT ANALYSIS
STRATEGIC DEFENSE INITIATIVE

I. INTRODUCTION

This arms control impact analysis addresses the following DoD and DoE programs:

<u>PE Number</u>	<u>Program Title</u>
63220C	Surveillance, Acquisition, Tracking, and Kill Assessment
63221C	Directed Energy Weapons
63222C	Kinetic Energy Weapons
63223C	Systems Analysis/Battle Management
63224C	Survivability, Lethality, and Key Technologies
DoE	Nuclear-Driven Directed Energy

These program elements form the Strategic Defense Initiative and are analyzed together for that reason.

II. PROGRAM DESCRIPTIONS

In his speech of March 23, 1983, President Reagan presented his vision of a future in which nations could live secure in the knowledge that their national security did not rest upon the threat of nuclear retaliation, but rather on the ability to defend against potential attacks. The Strategic Defense Initiative (SDI) research program is designed to determine whether -- and, if so, how -- advanced defensive technologies could contribute to the realization of this vision.

Under the SDI program, the United States is conducting intensive research focused on advanced defensive technologies with the aim of enhancing the basis of deterrence, strengthening stability, and thereby increasing the security of the United States and our Allies. A number of concepts, involving a wide range of technologies, are being examined. SDI research and development of defensive options will not lead to the abandonment of deterrence, but rather to an

enhancement of deterrence and an evolution in the means of deterrence through the contribution of defensive systems that threaten no one.

No single concept or technology has been identified as most appropriate. Initial studies indicate that there is real merit in the potential of advanced technologies to increase stability through employment of a multilayered defense capable of engaging enemy missiles and re-entry vehicles in all stages of flight. The SDI effort is also examining technologies which have the potential to defend against shorter-range ballistic missiles, and which could protect our Allies against nuclear and conventional ballistic missile attack.

To focus the SDI research, activities have been grouped into five program elements. Within each of these elements, the program seeks to: (1) advance the technology base, (2) conduct experiments that validate the technology, and (3) focus the overall technology development on those critical issues that must be resolved to establish the feasibility of various defensive concepts. While the current research program certainly emphasizes nonnuclear technologies, the US will continue to explore the promising concepts which use nuclear energy to power devices which could effectively destroy ballistic missiles at great distances. Further, it is useful to study these concepts to determine the feasibility and effectiveness of similar defensive systems that an adversary may develop against future US surveillance and defensive or offensive systems.

Following is a brief description of each program element; more detailed information is contained in Supporting Data for Fiscal Year 1987 Budget Estimates, Descriptive Summaries, a classified document published by the Department of Defense and submitted to the Congress. Additional information on these programs can be found in the FY 1986 Arms Control Impact Statement for the Strategic Defense Initiative and the 1985 Report to the Congress on the Strategic Defense Initiative published by the Department of Defense.

A. Surveillance, Acquisition, Tracking, and Kill Assessment (PE 63220C).

This program element includes major experiments in three classes: boost phase surveillance and tracking; mid-course detection, tracking, and discrimination; and terminal tracking and discrimination. These experiments are currently scheduled for test validation in the 1990s with the exception of the Airborne Optical Adjunct (AOA) which will begin testing in FY 1988.

During FY 1986, efforts will be dedicated to developing the supporting radar, infrared, and data processing technologies necessary for these major experiments, with the exception of the AOA which will be well into fabrication. For the other major experiments, emphasis in FY 1987 will concentrate on experimental hardware design. [deleted]

B. Directed Energy Weapons (PE 63221C).

This program element is advancing the state-of-the-art in the technologies for: (1) high power laser and particle beam generation; (2) optics and sensors for correcting and controlling the high power beam; (3) large, lightweight mirrors and lightweight magnets for focusing beams; (4) precision acquisition, tracking, and pointing subsystems to place and hold the beam correctly; and (5) fire control experiments to evaluate such features of directed energy weapons as the ability to measure and control the energy delivered at a precise range.

Activities in FY 1986 and FY 1987 will consist of: (1) continued technology base development; (2) resolution of the critical technical issues in atmospheric compensation as well as free electron laser and excimer laser device feasibility; (3) research into the near-term potential of a neutral particle beam system for midcourse discrimination and detection of nuclear material; (4) generic tracking and pointing experiments in space; (5) large optics and relay mirror technology experiments; and (6) high power integration and pointing/lethality experiments at White Sands Missile Range. DoD is also conducting research in directed energy lethality effects.

C. Kinetic Energy Weapons (PE 63222C).

This program element is a collection of related research that would evaluate the utility of chemically or magnetically launched interceptors when accelerated to a very high velocity. The program contains some of the more mature technologies being investigated in the SDI.

During FY 1986, a single contractor in two of the three major technology areas -- high endo-atmospheric interceptor and exo-atmospheric interceptor system -- is scheduled to be selected and concept definitions for each of these areas

are scheduled to be completed. Work is commencing on upgrading the national test ranges to support future test needs. In FY 1987, a space-based kinetic kill vehicle contractor will be selected who will provide a proof of principle for the concept. Work in other areas is scheduled to include brass-board demonstrations of critical technologies in the laboratory. Facility upgrades to the test ranges are scheduled to progress to the construction stage.

D. Systems Analysis/Battle Management (PE 63223C).

This program element is designed to support the analysis of different approaches to an architecture for strategic defense and to develop the battle management technologies and experiments which would be necessary to allow eventual implementation of a highly responsive, fault tolerant, survivable, easily maintained, and cost-effective battle management/command, control, and communication (C³) system. In addition, this program element defines and develops a National Test Bed to support SDI technology verifications.

Five contractors are scheduled to complete Phase II Systems Architecture Studies in FY 1986, focusing on high-payoff systems tradeoffs and detailed analyses of the overall SDI architecture. Definition of feasible Battle Management/C³ architectures will lead to designs for experiments as well as technology development tasks and methodology for experiment validation. The concept definition, and preliminary definition for the National Test Bed are scheduled to be completed and a site selected for the National Test Facility. In FY 1987, Phase III of the Systems Architecture Studies will lead to the selection of a single SDI System Architect and Program Integrator. Initial Battle Management/C³ experiments will also be undertaken. Also in FY 1987, a prime contractor is scheduled to be selected for implementation actions for the National Test Bed.

E. Survivability, Lethality, and Key Technologies (PE 63224C).

This program element provides critical supporting research and technology in five major areas: (1) defense system survivability; (2) lethality of various interceptor approaches to ballistic missiles, post-boost vehicles, and re-entry vehicles; (3) economical space transportation, on-orbit logistics and maintenance; (4) affordable kilowatt/megawatt sources of power and multi-megajoule energy storage and conversion; and (5) advanced materials development.

FY 1986 has seen continued emphasis on the development of a wide range of passive and active countermeasures, with new starts in the area of [deleted]. In addition, laboratory tests and simulations have been conducted to determine the lethality of directed and kinetic energy candidate weapons. Definition of a preliminary set of power system requirements is scheduled for completion this year. In the space logistics field, results from the space transportation and support architecture studies are scheduled for evaluation. In FY 1987, survivability assessments are scheduled to begin, the technical feasibility and estimated cost of the defense suppression threat will be determined, and several promising concepts for active and passive countermeasures are scheduled to be selected for further development and laboratory testing. Lethality testing and analysis are scheduled to continue, as are power system design and subsystem construction and testing. In space logistics, efforts to support the emerging system architectures with space transportation and logistics infrastructure concepts are scheduled to continue, and efforts to understand the potential of integrating advanced technology are scheduled to be emphasized.

F. Nuclear-Driven Directed Energy (DoE).

This is primarily a DoE project to determine the feasibility of nuclear-driven directed energy weapons (NDEW). Nuclear research is included in the SDI program for two reasons: (1) threat definition and (2) defensive system options. Threat definition refers to understanding the Soviet capability to design and deploy NDEW which would put the US retaliatory force or a future defensive system at risk. These data are required as soon as possible because of the potential impact they could have on current nonnuclear SDI research and planning. Research on NDEW is also being conducted for US SDI options because of the potentially unique capabilities of such weapons and as a hedge against the failure of nonnuclear defensive weapons to meet performance requirements.

[deleted]

[deleted]

III. SYSTEM DESCRIPTION

A. US Strategic Defensive System.

The United States has no defense against ballistic missile attack. The limited ABM point defense system at Grand Forks, North Dakota, permitted by the 1972 ABM Treaty, was deactivated within three months of its initial operational status. The US maintains limited air and civil defense programs.

B. Soviet Strategic Defensive System.

The Soviet Union has long maintained an extensive ballistic missile defense (BMD) research, development, testing and deployment program, massive air defenses, and a large-scale civil/passive defense effort. Their BMD program includes:

- Deployment around Moscow of the world's only operational ABM system;
- The upgrading of this system with improved long-range and new short-range interceptor missiles and a new sophisticated radar;
- Development of components for a new ABM system that potentially could support a breakout from the ABM Treaty;
- Development of a new air defense missile system, the SA-X-12, which has the capability to attack bombers and short-range ballistic missiles and which, in addition to the SA-10, may have the potential to intercept some types of strategic ballistic missiles; and
- Research and development on advanced weapons technologies -- such as lasers and neutral particle beams -- with application to ballistic missile defense, as well as antisatellite systems.

Over the past two decades, the Soviet Union has invested approximately as much overall in strategic defenses as it has in its strategic offensive buildup. These defenses include active defenses against missiles and bombers as well as passive measures to improve the survivability of its own

forces, military command structure, and national leadership. As a result, today it enjoys certain important advantages in the area of active and passive defenses.

A more detailed description of Soviet strategic defensive programs can be found in the latest edition of Soviet Military Power (April 1985) published by the Department of Defense and Soviet Strategic Defense Programs (October 1985) published by the Departments of Defense and State. These unclassified documents report the long-term efforts of the Soviet Union to develop defenses against ballistic missiles.

The President's unclassified Report to the Congress on Soviet Noncompliance with Arms Control Agreements (December 23, 1985) describes Soviet defensive efforts which go beyond those allowed by the ABM Treaty. A new Soviet large phased-array radar being constructed near Krasnoyarsk was specifically mentioned. One of the findings of the President's Report noted that:

The new large phased-array radar under construction at Krasnoyarsk constitutes a violation of legal obligations under the Anti-Ballistic Missile Treaty of 1972 in that in its associated siting, orientation, and capability, it is prohibited by this Treaty.*

The President's Report also found that:

Soviet actions with respect to ABM component mobility are ambiguous, but the development of components of an ABM system, which apparently are designed to be deployable at sites requiring relatively little site preparation, represent a potential violation of its legal obligation under the ABM Treaty. This and other ABM-related Soviet activities suggest that the USSR may be preparing an ABM defense of its national territory.

* Article VI(b) of the ABM Treaty states that each Party undertakes "not to deploy in the future radars for early warning of strategic ballistic missile attack except at locations along the periphery of its national territory and oriented outward." The Krasnoyarsk radar is not located on the periphery, but in the interior of the Soviet Union, and it is not oriented outward.

Deployment of ABM systems for a defense of the territory of a Party's country is prohibited by Article I of the ABM Treaty.

IV. ANALYSIS

A. Consistency with US Arms Control Policy and Related Presidential Decisions.

The policy for the conduct of the SDI program has been stated in The President's Strategic Defense Initiative (a White House pamphlet dated January 1985). In his Foreword, the President stated that:

Our research under the Strategic Defense Initiative complements our arms reduction efforts and helps to pave the way for creating a more stable and secure world. The research that we are undertaking is consistent with all of our treaty obligations, including the 1972 Anti-Ballistic Missile Treaty.

In the near term, the SDI research program also responds to the ongoing and extensive Soviet anti-ballistic missile effort, which includes actual deployments. It provides a powerful deterrent to any Soviet decision to expand its ballistic missile defense capability beyond that permitted by the ABM Treaty. And, in the long term, we have confidence that SDI will be a crucial means by which both the United States and the Soviet Union can safely agree to very deep reductions, and eventually, even the elimination of ballistic missiles and the nuclear weapons they carry.

B. Relation to Arms Control Treaties and Agreements.

The US SDI research program is wholly compatible with all US international obligations including the Anti-Ballistic Missile Treaty. It is comparable to research permitted by the ABM Treaty which the Soviets have been conducting for many years and is a prudent hedge against a possible Soviet breakout from ABM Treaty limitations through the deployment of a territorial ballistic missile defense.

The treaties and arms control agreements referred to in this section are provided in greater detail in the Treaty appendix to this ACIS. Specific treaties and arms control agreements which relate to the SDI research program are discussed below.

1. The ABM Treaty.*

The ABM Treaty is an agreement of unlimited duration that places restrictions on ABM deployments and limits certain aspects of ABM testing and development. Previous Arms Control Impact Statements stated that the ABM Treaty prohibition on development, testing, and deployment of sea-based, air-based, space-based, or mobile land-based ABM systems, or components for such systems, comes into effect when such ABM systems or ABM components enter the field testing stage. Following a recent (October 1985) US government review of the ABM Treaty text and negotiating record, the President concluded that a broader interpretation of the Treaty's restrictions is fully justified. Under this broader interpretation, the US could pursue the testing and development of ABM components based on other physical principles without violating the ABM Treaty.

The SDI research program was originally structured in a manner that was designed to permit it to achieve critical research objectives while remaining consistent with a more narrow interpretation of the ABM Treaty. This being the case, in October 1985, the President determined that as long as the program receives the support needed to implement its plan, it is not necessary to restructure the SDI program towards the boundaries of Treaty interpretation which the US could observe. The FY 1987 SDI program consists of technology research projects and technology experiments that are well defined and, consistent with the President's guidance, comply with the Treaty.

The SDI research program will be conducted in a manner which fully complies with the ABM Treaty and will provide to a future President and Congress, possibly in the early 1990s, the technical knowledge required for a decision on whether to develop and later deploy advanced defensive systems. Such development and deployment, given a decision to proceed, would require discussions and, as appropriate, negotiations with the Soviet Union in accordance with the ABM Treaty. The ABM Treaty provides for possible amendments at any time and also for review sessions every five years during which possible changes can be discussed. Also, Article XV(2) provides a right to withdraw from the Treaty

* Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Anti-Ballistic Missile Systems (signed at Moscow May 26, 1972; entered into force October 3, 1972).

on six months notice if a Party "decides that extraordinary events related to the subject matter of this Treaty have jeopardized its supreme interests." In this connection, during the SALT I negotiations Ambassador Gerard Smith stressed the importance the US Government attaches to achieving agreement on more complete limitations on strategic offensive arms following agreement on an ABM Treaty and the interim SALT Agreement. He stated:

If an agreement providing for more complete strategic offensive arms limitations were not achieved within five years, US supreme interests could be jeopardized. Should that occur, it would constitute a basis for withdrawal from the ABM Treaty.

Research on defensive systems, such as that embodied in the SDI research program, is not only permitted by the ABM Treaty, but was anticipated at the time it was negotiated and signed. Both the United States and the Soviet Union supported this position in testimony to their respective legislative bodies. When the Treaty was before the US Senate for advice and consent to ratification, Defense Secretary Melvin Laird advocated in his testimony that the US "vigorously pursue a comprehensive ABM technology program." In a statement before the Soviet Presidium, Minister of Defense Grechko said that the ABM Treaty "places no limitations whatsoever on the conducting of research and experimental work directed towards solving the problem of defending the country from nuclear missile strikes."

2. Other Agreements.

Article IV of the Outer Space Treaty* prohibits the placement in orbit around the Earth, installation on celestial bodies, or stationing in outer space of nuclear weapons or any other kinds of weapons of mass destruction. The Limited Test Ban Treaty** prohibits the Parties to the

* Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies (signed at Washington, London, and Moscow January 27, 1967; entered into force October 10, 1967)

** Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water (signed at Moscow August 5, 1963; entered into force October 10, 1963)

Treaty from carrying out nuclear explosions of any kind in the atmosphere, underwater, or in space. Only underground tests are permitted. These treaties do not prohibit the underground testing of directed energy weapons driven by an underground nuclear explosion.

The 1974 Threshold Test Ban Treaty (TTBT)* and the 1976 Peaceful Nuclear Explosions Treaty (PNET)**, both of which are unratified, limit the yield of nuclear devices undergoing tests to 150 kT. Nuclear devices might be used in some SDI-related projects as weapons energy sources. This could be done without exceeding the 150 kT limit.

The primary emphasis of the SDI is on nonnuclear defensive systems.

C. Effect on Current and Prospective Negotiations.

SDI programs are consistent with present US positions in arms control negotiations. A more detailed description of the negotiating environment is contained in the Arms Control Policy section of this ACIS.

The cancellation of the US SDI research program is a major Soviet objective (if not the major objective) in the bilateral Nuclear and Space Talks being conducted in Geneva. Without specifically addressing the US SDI research program, however, the US-Soviet joint statement issued after the November 20-21 summit between President Reagan and General Secretary Gorbachev noted that:

They agreed to accelerate the work at these negotiations, with a view to accomplishing the tasks set down in the joint US-Soviet agreement of January 8, 1985, namely to prevent an arms race in space and to terminate it on Earth, to limit and reduce nuclear arms and enhance strategic stability.

* Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Underground Nuclear Weapon Tests (signed at Moscow July 3, 1974; unratified)

** Treaty Between the United States of America and the Union of Soviet Socialist Republics on Underground Nuclear Explosions for Peaceful Purposes (signed at Washington and Moscow May 28, 1976; unratified)

Effective defenses against ballistic missiles have potential for enhancing stability in the future by significantly increasing an aggressor's uncertainties regarding the ability of his weapons to penetrate the defenses and destroy his opponent's strategic forces and other military targets. These uncertainties, in concert with effective retaliatory forces, would serve to reduce or eliminate the incentive for first strike attack. By significantly reducing or eliminating the ability of ballistic missiles to attack an opponent effectively, advanced defenses could render this potential major source of instability impotent and obsolete as a means of supporting aggression.

The United States is even now looking forward to a more stable world, with greatly reduced levels of nuclear arms and an enhanced ability to deter war based upon the increasing contribution of nonnuclear defenses against offensive nuclear arms. A world free of the threat of military aggression and free of nuclear arms is an ultimate objective to which the United States, the Soviet Union, and all other nations can agree.

If the SDI research yields positive results, the US would consult with its Allies about the potential next steps. The US would then consult and negotiate, as appropriate, with the Soviet Union, pursuant to the terms of the ABM Treaty, on how deterrence might be strengthened through the phased introduction of defensive systems into the force structures of both sides. This commitment does not mean that the US would give the Soviets a veto over the outcome anymore than the Soviets have a veto over current US strategic and intermediate-range programs. The US commitment in this regard reflects its recognition that, if the research yields appropriate results, the US should seek to move forward in a stable way. The US has already begun in Geneva the process of bilateral discussion needed to lay the foundation for the stable integration of advanced defenses into the forces of both sides at such time as it may become both possible and desirable to do so.

D. Verifiability.

The US policy on the verifiability of arms control agreements is summarized in the Arms Control Policy section of this ACIS.

The Soviets probably would not consider the verification of US compliance with present or possible future ABM-related arms control measures to be a major problem. They

have a variety of intelligence resources and fully exploit their capabilities. Expertise accumulated through the SDI research program could assist the US in its efforts to assess Soviet compliance with ABM-related arms control measures. Laboratory experiments are extremely difficult to monitor for both the US and the Soviet Union.

V. SUMMARY AND OVERALL ARMS CONTROL ASSESSMENT

The FY 1987 US Strategic Defense Initiative research program is designed to: (1) determine whether advanced defensive technologies are feasible and could enhance deterrence and stability in the future, (2) provide a defensive technology base to hedge against Soviet violation of or withdrawal from the ABM Treaty, and (3) avoid technological surprise.

The Soviets maintain around Moscow the world's only operational ABM system and are continuing to upgrade this system. The USSR has an improving potential to deploy modernized ABM defenses well beyond the 100-launcher ABM Treaty limits, and is conducting research on relatively rapidly deployable ABM components for which individual sites could be built in months instead of years. In addition, the Soviets have a long-standing research and development effort on advanced defense technologies which are applicable to ground- and space-based ABM weapon systems.

The Strategic Defense Initiative research program submitted with the FY 1987 budget is consistent with all US international obligations including the ABM Treaty, supports US arms control and national security policy, and is consistent with the US position in current arms control negotiations.

In the near term, the SDI research program responds to the ongoing and extensive Soviet ABM research, development, testing, and deployment efforts. It provides a powerful deterrent to any Soviet decision to expand its anti-ballistic missile defense system beyond that permitted by the ABM Treaty. In the long term, the Administration is confident that the Strategic Defense Initiative will be a crucial means by which both the United States and the Soviet Union can safely agree to very deep reductions, and eventually, even the elimination of ballistic missiles and the nuclear weapons they carry. In short, the SDI research program seeks to find ways to use advanced technologies to allow us to move towards an enhanced, more stable deterrent based upon the increased contribution of defensive systems that threaten no one.

ARMS CONTROL IMPACT ANALYSIS

SPACE DEFENSE

I. INTRODUCTION

This arms control impact analysis addresses the following DoD programs:

<u>PE Number</u>	<u>Program Title</u>
64406F	Space Defense Systems (Antisatellite)
63438F	Satellite Systems Survivability
12424F	SPACETRACK and Associated Procurement
12311F	NORAD Cheyenne Mountain Complex - Space Defense Systems

These programs comprise the Air Force Space Defense Systems Program effort involving four functional areas: Anti-satellite (ASAT), Satellite Systems Survivability, Space Surveillance Technology, and Command and Control. These programs are oriented toward defense against hostile satellites; programs oriented toward the support and protection of friendly space systems and a defense against strategic ballistic missiles are described and analyzed in the Strategic Defense Initiative ACIA.

II. PROGRAM DESCRIPTIONS

Detailed information on the following DoD programs is contained in Supporting Data for Fiscal Year 1987 Budget Estimates, Descriptive Summaries, a classified document published by the Department of the Air Force and submitted to the Congress. Also, additional information on these programs can be found in the FY 1986 Arms Control Impact Statement for Space Defense.

A. Space Defense Systems (PE 64406F).

Under this program, the Air Force is developing and testing a nonnuclear ASAT capability. The primary purposes of a United States ASAT capability are to deter

threats to space systems of the United States and its Allies and, within such limits imposed by international law, to deny advantages to any adversary arising from the offensive use of space-based systems which could undermine deterrence.

A successful test of the US ASAT involving a US satellite which had completed its primary mission was performed on September 13, 1985. Repeal of current Congressionally imposed restrictions on additional tests against Instrumented Test Vehicles/Resident Space Objects will be requested this year. Testing is planned to continue in FY 1987 with Initial Operational Capability scheduled for [deleted].

B. Satellite Systems Survivability (PE 63438F).

This program provides survivability planning and analysis and develops the necessary prototype hardware, software, technology, operational procedures, strategy, and tactics that will provide generic survivability capabilities for the military space systems of the United States. The program is structured to provide balanced survivability among all space systems elements: satellites, data/command links, and ground stations. Major development efforts within this program are: (1) the Satellite On-Board Attack Reporting System (SOARS -- an attack detection characterization and reporting system which is planned for incorporation into most upcoming satellite block changes), and (2) a Transportable Mobile Ground Station (TMGS) designed to improve the survivability of telemetry, tracking, and control and mission data handling capability of most military satellites.

SOARS development will commence in FY 1986, and work will continue to develop Configuration Enhanced Radiation Rejection (CERR) materials to protect satellites against the effects of lasers. In FY 1987, the CERR hardware will be fabricated and qualification testing will begin. SOARS development will continue with the Preliminary Design Review (PDR) scheduled for early FY 1987. The TMGS is now operational, and there are no additional development funds programmed.

C. SPACETRACK and Associated Procurement (PE 12424F).

This program incorporates near- and far-term operational systems into SPACETRACK, the US space surveillance network, in support of attack warning and verification, [deleted]. Major projects under this program element include the Ground-Based Electro-

Optical Deep Space Surveillance (GEODSS) system and improvements to other ground-based sensors.

Construction of the last of five GEODSS sites is scheduled to begin in FY 1986. In FY 1987, the fourth GEODSS site at Diego Garcia will become operational. Installation of the fifth site in Portugal will begin, as will construction on Saipan Island for the Central Pacific barrier radar.

D. NORAD Cheyenne Mountain Complex - Space Defense Systems (PE 12311F).

This program element supports development of the following Space Defense Command and Control System (SPADCCS) systems: the Space Defense Operations Center (SPADOC) for control of all US space defense activities and space surveillance systems, the Prototype Mission Operations Center (PMOC) for antisatellite test activities, the Mission Control Center (MCC) for ASAT operations, and the North American Aerospace Defense (NORAD) Space Surveillance Center (NSSC) upgrade for orbit parameter computations, and the associated communications networks.

In FY 1986, the first block of the SPADOC will become operational. The second block, which includes improvements to the NSSC, will enter the design phase. The PMOC will continue to support ASAT testing and design of the MCC will begin. In FY 1987, development of Block B for SPADOC and MCC will begin.

III. SYSTEM DESCRIPTION

The ability of both the United States and the Soviet Union to use military power on a worldwide basis is increasingly dependent on effective and reliable operation of various satellite systems. These satellite systems are required to provide critical strategic and tactical support to national decision makers and military force commanders at all levels of conflict. They specifically provide missile attack warning, strategic and tactical navigation, surveillance, intelligence, communications, and meteorological information, as well as providing support to strategic, tactical, and rapid deployment forces on a global basis.

The United States has strong incentives to improve the survivability of its space assets. Soviet technological capability to conduct electronic warfare against space systems, the fact that they possess an operational orbital ASAT

interceptor system, ground-based test lasers with probable ASAT capabilities, and the nuclear-armed GALOSH ABM interceptors with possible ASAT capabilities, all represent varying degrees of threat to the effective use of US space systems. A US ASAT capability will not diminish these threats, but it could help deter Soviet use of their ASAT capabilities. It could, however, cause the Soviets to increase their level of effort on developing new ASAT systems.

The United States has equally strong incentives to develop an interceptor ASAT capability. Some Soviet space systems are designed to enhance the performance of their surface, sea, and aerospace forces and represent a threat to US and Allied warfighting capabilities. In particular, the Soviets operate satellites that provide derived targeting data to weapon platforms. In the absence of a comparable US system as a deterrent, the Soviet ASAT program (the capabilities of which are described below in Section IIIB) provides a unilateral Soviet military advantage. In crisis or conflict, their exploitation of such an advantage, even with attainable increased survivability for US satellites, would be detrimental to US and Allied interests.

A. US Space Defense System.

The US currently has no operational ASAT system. The testing program has included a successful intercept and destruction of a pre-designated US target satellite. The Air Force ASAT system now being tested will provide a capability for nonnuclear attack against low-altitude [deleted] Soviet satellites, including those that directly support Soviet combat forces. It also will give the US a capability to diminish unilateral Soviet military use of space.

In addition, there is a growing threat posed by present and planned Soviet satellites which, while not weapons themselves, are designed to support directly the USSR's terrestrial forces in the event of a conflict. These include radar ocean reconnaissance satellites (RORSAT) and electronic ocean reconnaissance satellites (EORSAT) [deleted]. In view of the fundamental importance of US and Allied access to the seas in wartime, including for Allied reinforcement by sea, the protection of US and Allied navies against such targeting is critical.

The air-launched ASAT currently under development by the United States consists of a modified Short Range Attack Missile (SRAM) first stage, an ALTALR III second stage, and a Miniature Vehicle (MV) nonnuclear warhead. ASAT missiles will be launched from designated, dual mission, air defense F-15s.

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Although some measures can be taken to reduce US satellite vulnerability, and some satellites are presently less susceptible to direct interceptor attack because they are in orbits beyond the range of the operational Soviet orbital ASAT system, it is not possible to make US satellites invulnerable to every form of attack, or to repeated attacks. It is possible through a selective mix of countermeasures to make hostile attacks more difficult, more visible, more costly, and less certain of early success. Some measures to improve satellite survivability such as hardening, increased maneuver capability, the use of decoys and chaff, deep space storage, proliferation, or combinations of these and other countermeasures could be very expensive. Some survivability measures (e.g., maneuvering to survive) also degrade satellite mission performance.

Satellite survivability measures will not ensure the availability of space systems in time of crisis. For example, attacks on other elements of a space system (e.g., ground stations, launch facilities, or communications links) may in some cases be easier and more effective than attacks on satellites themselves.

[deleted]

[deleted]

US space defense efforts include passive defense programs to make US satellites and their ground links more survivable by enabling them to endure or evade attack. Such programs have virtually no negative implications for arms control. These measures increase the survivability of assets that contribute to better communications, command, control, and intelligence, making it less likely that the US would overreact due to inadequate information, but assuring the ability to respond as necessary. They also decrease the Soviet motivation to attack US satellites because they increase the chances that such an attack would fail, and would be detected by the US.

B. Soviet Space Defense System.

Since the early 1970s, the Soviets have had the operational capability to attack satellites in near-earth orbit with a ground-based orbital interceptor. Using a radar sensor and a pellet-type warhead, the interceptor can attack a target in various orbits [deleted] during its first two revolutions. An intercept during the first orbit would reduce the time available for a target satellite to take evasive action. The interceptor can reach targets orbiting at more than 5000 km (2700 nm) [deleted] [deleted] for some orbital inclinations, but it is probably intended for high priority satellites at lower altitudes. [deleted] In addition to the orbital interceptor, the Soviets have ground-based test lasers with probable ASAT capabilities, the nuclear-armed GALOSH ARM with possible ASAT capabilities, and the technological capability to conduct electronic warfare against space systems.

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IV. ANALYSIS

A. Consistency with US Arms Control Policy and Related Presidential Decisions.

The US Space Defense Systems Program is being pursued in strict compliance with US arms control policy and Presidential decisions. The President announced a national space policy on July 4, 1982, that was designed to set the direction of US efforts in space for the next decade. That policy is embodied in a National Security Decision Directive (NSDD-42; July 12, 1982) which stated that the US will conduct those activities in space that are necessary for national defense. Those national security activities will be conducted consistent with international obligations. National security space programs shall support such functions as command and control, communications, navigation, environmental monitoring, warning, surveillance, and space defense. Survivability and endurance of space systems, including all system elements, will be pursued commensurate with their planned use in crisis and conflict, with the threat, and with the availability of other assets to perform the mission.

NSDD-42 stated that the US will develop and deploy an ASAT capability to achieve an operational system [deleted]. The primary military purposes of a US ASAT capability are to deter threats to space systems of the US and its Allies and, within such limits as are imposed by international law, to deny to any adversary the use of space-based systems that provide support to hostile military forces. The US will also develop and maintain an integrated attack warning, notification, verification, and contingency reaction capability which can effectively detect and react to threats to US space systems.

The President's March 31, 1984, Report to the Congress on US Policy on ASAT Arms Control contained a comprehensive statement of Administration policy in this area. In that Report, the President reaffirmed the basic policy of the July 1982 statement:

The United States will continue to study space arms control options. The United States will consider verifiable and equitable arms control measures that would ban or otherwise limit testing and deployment of specific weapons systems, should those measures be compatible with United States national security.

The President went on to affirm in the Report that the US was "prepared to examine space arms control issues in the Conference on Disarmament" in Geneva as well.

In addition to space defense efforts, an equitable and verifiable arms control agreement compatible with US national security interests, if complied with, might limit specialized threats to US satellites and constrain future threats to such key satellites as those for early warning. Such limitations on specialized threats to satellites, together with satellite survivability measures, could help preserve and enhance stability.

In his certification to the Congress on August 20, 1985, prior to the test of the ASAT against an object in space on September 13, 1985, the President reaffirmed the conclusions of his 1984 Report by stating that:

. . . any realistic and balanced consideration of this topic must take into account a number of problems. These problems include: the need for effective verification; the potential for breakout; the risks of disclosing sensitive information; the problems of definition of space weapons; the vulnerability of satellite support systems; and Soviet military space activity. In particular, it should be noted that definitional and monitoring difficulties plus the need to counter such satellites as the space-based, targeting elements of Soviet weapons systems, contribute to the conclusion that a comprehensive ban that would seek to eliminate development, testing, deployment, and use of all means of countering satellites is not verifiable and not in our national security interests. Moreover, no arrangements or agreements beyond those

already governing military activities in outer space have been found to date that are judged to be in the overall interest of the United States and its Allies and that meet the Congressionally-mandated requirements of verifiability and consistency with the national security.

Notwithstanding these difficulties, the United States is continuing to study space arms control, in search of selected limits on specific types of space systems or activities in space which could satisfactorily deal with problems such as those described above.

With regard to the negotiations in Geneva which began in March 1985, the President stated in his certification that:

. . . we believe that testing can constitute an incentive to the Soviet Union to reach agreements on a wide range of issues and thus would not impair prospects for a successful conclusion to the negotiations now underway.

B. Relation to Arms Control Treaties and Agreements.

The treaties and arms control agreements referred to in this section are described in greater detail in the treaty appendix to this ACIS. The US Space Defense Systems Program is conducted in strict compliance with US obligations under international treaties and agreements.

The Outer Space Treaty establishes a general norm for peaceful uses of outer space. Article III states that the space activities of States Parties to the Treaty shall be conducted ". . . in accordance with international law, including the Charter of the United Nations, in the interest of maintaining international peace and security and promoting international cooperation and understanding." Article IV prohibits the placement in orbit around the Earth, installation on celestial bodies, or stationing in outer space of nuclear weapons or any other kinds of weapons of mass destruction. In addition, Article IX requires international consultations prior to any planned space activity or experiment if the Party undertaking it has reason to believe such activity or experiment would cause potentially harmful interference with the peaceful exploration and use of space by other Parties.

The prohibition in the UN Charter against the threat or use of force by one State against another (except in

legitimate individual or collective self-defense in the event of armed attack, as recognized by Article 51 of the Charter) would, of course, apply to attacks on space objects.

The Convention on Registration of Objects Launched into Outer Space provides cooperative means to monitor some space activities. Parties to the Convention shall furnish to the Secretary General of the United Nations as soon as practicable after a successful launch into earth orbit or beyond:

- Name of launching State or States;
- An appropriate designation of the space object, or its registration number;
- Date and territory or location of launch;
- Basic orbital parameters, including nodal period, inclination, apogee, and perigee; and
- General function of the space object.

The ABM Treaty (Article XII) prohibits interference with national technical means (NTM)* used to verify compliance with strategic arms control agreements, but does not address specifically development, testing, or deployment of ASAT systems. The SALT I Interim Agreement (Article V) and Article XV of the unratified SALT II Treaty follow similar approaches.

Other international agreements extend specific protections to certain classes of satellites. Under the 1971 Direct Communications Link Improvement Agreement between the United States and the Soviet Union, both nations have confirmed their intention to take all possible measures to assure the continuous and reliable operation of the emergency satellite system; and under the International Telecommunications Convention, each party is obligated to avoid harmful interference with the radio services or communications of other parties.

* The term "NTM" is not defined in any international agreement; however, both the US and the Soviet Union understand it to include satellites.

C. Effect on Current and Prospective Negotiations.

Combined with continued US willingness to discuss proposals for an ASAT ban, or other limitations, our clear determination to proceed with the current ASAT program -- and therefore deny the Soviet Union a unilateral strategic advantage in this area -- makes a positive contribution to current negotiations.

The Soviet leaders have mounted a major public campaign against US space defense programs. In international fora and in the free Western press they have attempted to generate political pressure against US space defense programs while protecting their own unilateral advantages and minimizing their own extensive space defense capabilities and developmental efforts. A more detailed discussion of Soviet efforts is contained in the FY 1986 ACIS and in Soviet Strategic Defense Programs, published by the Departments of Defense and State.

The US is actively discussing arms control questions in detail with the Soviets in the bilateral Nuclear and Space Talks in Geneva, in a search for equitable and verifiable agreements that serve the interests of both sides. The US is also actively participating in the work of the (non-negotiating) Ad Hoc Committee on Outer Space Arms Control established at the Conference on Disarmament.

D. Verifiability.

The US policy on the verifiability of arms control agreements is summarized in the Arms Control Policy section of this ACIS. A more detailed discussion of ASAT verifiability is contained in the President's 1984 Report to the Congress on ASAT Arms Control Policy.

Effective verification is fundamental to arms control. This applies to space arms control as it does to arms reductions in other fora. The Congressional language mandating ASAT arms control efforts has been uniformly specific on the matter of verification: any ban on ASAT systems must be effectively verifiable.

In general, verification of arms control agreements suffers from the extremely asymmetric degree of openness between the United States and the Soviet Union. The nature of US society makes the Soviet task of monitoring US activities regarding arms control compliance a relatively easy matter. In contrast, the closed Soviet society and the Soviet tendency

toward secrecy make US monitoring and verification of compliance much more difficult. Some critically important US defense missions depend on a small number of satellites. Therefore, cheating on ASAT limitations, even on a small scale, could pose a disproportionate risk to United States and Allied security.

V. SUMMARY AND OVERALL ARMS CONTROL ASSESSMENT

The US space defense program comprises four major functional areas: (1) space defense systems; (2) satellite systems survivability; (3) space surveillance systems; and (4) command and control.

The principal US policy applicable to space defense is the national space policy announced by the President on July 4, 1982, as expanded in the March 1984 Report to the Congress on US Policy on ASAT Arms Control. The principal relevant arms control agreements are the Outer Space Treaty and the ABM Treaty.

Although these arms control agreements constrain some forms of activity in outer space, they do not prohibit the US from developing a nonnuclear ASAT interceptor such as the MV. The Soviets are conducting a significant propaganda effort to isolate the US on this issue, and are tabling space arms control initiatives in the bilateral Geneva negotiations and in various multilateral fora. At the same time, the Soviets are attempting to divert attention away from their own unilateral advantages and extensive space research and development programs.

An arms control agreement eliminating current and future Soviet ASAT capabilities would be extremely difficult to verify. In the absence of such an agreement, the Soviets will continue to possess a unilateral advantage until the US MV system is operational, in that they now have the capability to attack some satellites which make important contributions to US warning and warfighting capabilities. Soviet satellites that provide targeting information to surface forces would be immune from destruction until the US deploys its ASAT interceptor.

As the President pointed out in his August 1985 certification to the Congress:

The United States must take the steps necessary to avert a situation in which the Soviet Union has full freedom to conduct effective attacks on

our space systems knowing that their space objects, including those that provide targeting data, are not vulnerable to US attack. The resultant instability from this asymmetry creates a risk of irrevocable harm to the United States.

The US will continue to study possible ASAT limitations to determine whether limitations which are consistent with the national security interests of the United States can be identified, and will continue to address space arms control issues in the bilateral Nuclear and Space Talks and in the multilateral Conference on Disarmament.

The Space Defense Systems Program submitted with the FY 1987 budget is consistent with all US treaty obligations, supports US arms control and national security policy, and is consistent with the US position in current arms control negotiations.

ARMS CONTROL IMPACT ANALYSIS

CHEMICAL WEAPONS

I. INTRODUCTION

This portion of the arms control impact analysis addresses the following DoD programs:

<u>PE Numbers</u>	<u>Program Title</u>
63615A	Lethal Chemical Munitions Concepts
62602F/2946	Conventional Weapons: Retaliatory Chemical Technology
64604N/64601F	Chemical Warfare Weapons
Procurement	Chemical Retaliatory Capabilities (Munitions)
Procurement	Chemical Retaliatory Capabilities (Facilities)

The above programs are aggregated in order to assess the development of an adequate US deterrent to the serious and growing chemical warfare (CW) threat faced by this country, and the consistency of such a deterrent with US arms control policy. Congress has recognized this need and has approved the start of binary chemical weapons production. Although it will be at least two years before the first binaries will be assembled (December, 1987), their contemplated entry into the stockpile will constitute a major change in the US CW program, which has added no new munitions since our unilateral moratorium on chemical weapons production in 1969.

II. PROGRAM DESCRIPTIONS

Detailed information on the following DoD programs is contained in: Supporting Data for Fiscal Year 1986 Budget Estimates, Descriptive Summaries (Army, Navy & Air Force), classified documents submitted to the Congress. Also, additional information on these programs can be found in the FY 1986 Arms Control Impact Statement for Chemical Warfare.

A. Lethal Chemical Munitions Concepts (PE 63615A).

The Army, which is the executive agent for chemical weapons research and development, conducts this program with the aims of:

- replacing the current stockpile with munitions compatible with current and projected delivery systems; and
- providing the retaliatory rear-echelon attack capability required for credible deterrence.

The program performs advanced development activities related to binary lethal chemical munitions. These include the design and installation of small-scale production units aimed at obtaining process engineering data for future manufacturing facilities.

At present, one binary munition is undergoing advanced development under this program, the XM135 warhead that will be used in the Multiple Launch Rocket System. Completion of advanced development for the XM135 is scheduled for FY 1987, although operational testing will continue beyond this date.

B. Conventional Weapons: Project 3072, Retaliatory Chemical Technology (PE 62602F/2946).

This Air Force program, which began in FY 1986, will continue a study to evaluate alternative approaches to the packaging and dispersing of chemical agents from advanced dispensers. In FY 1987, dissemination concept models will be fabricated and tested. The goal of the program is to provide a standoff, air-launched capability for chemical munitions.

C. Chemical Warfare Weapons (PE 64604N/64601F).

This project is to provide a 500-pound binary spray bomb (BIGEYE) which will utilize two non-lethal chemical reactants to generate a persistent lethal agent. The reactants are shipped and stored separately and assembled unmixed just prior to loading onto the delivery aircraft. The weapon is being flight tested with simulant.

For FY 1986, it is planned to contract for low-rate initial production of components after completing the first phase of an initial operational test and evaluation.

D. Chemical Retaliatory Capabilities Procurement (Munitions).

Two munitions are available for production, the 155mm howitzer binary chemical projectile and the BIGEYE bomb. The howitzer projectile is designed to provide a modernized close-in retaliatory capability using a nonpersistent agent (GB-2). The BIGEYE, as an aircraft-delivered weapon designed to generate a persistent agent (VX-2), will correct the serious lack of an effective capability to deliver a persistent agent beyond artillery range. The approved funding for FY 1986 will provide initial production of 155mm projectiles. FY 1987 funding is being requested to continue production of the 155mm round and begin production of the BIGEYE bomb.

E. Chemical Retaliatory Capability Procurement (Facilities).

The production base for the 155mm projectile is in the process of completion. For the 155mm binary projectile, one of the two necessary manufacturing facilities is now on line and the second remains to be built in FY 1987. For BIGEYE, all the facilities except for a FY 1987 metal parts expansion project are in the 1986 budget. The FY 1986 and proposed FY 1987 facilities program will complete the production base for the 155mm GB-2 projectile and BIGEYE bomb.

III. SYSTEM DESCRIPTION

A. US System.

At present the US does not possess the chemical weapons stockpile required for effective deterrence. The Joint Chiefs of Staff have estimated the US retaliatory requirement for effective deterrence to be approximately [deleted] of agent, composed of nonpersistent agent in artillery shells, semipersistent agents in rockets, or persistent agent in bombs. Today, the militarily useful US stockpile consists of less than half of this requirement. Approximately [deleted] of unitary nerve agent are contained in 155mm and 8-inch projectiles and non-persistent bombs. However, the present useful US stockpile, which averages 26 years of age, is deficient in that over half the artillery projectiles are inappropriately filled with persistent agent (it would be extremely dangerous and expensive to attempt to re-fill such projectiles). Additionally, there is presently no effective means for the delivery of persistent agent beyond artillery range (present bomb holdings contain no

persistent agent), and all munitions are between 16 and 34 years old. Beyond this the remainder of agent on hand is either in munitions which have lost their utility (defective rounds, items without delivery systems, or with severe operational restrictions), or in bulk storage [deleted] for which there are no appropriate filling facilities, and the construction of which would not be deemed cost-effective.

Given the current planned modernization programs, the first of the binary weapons can be assembled in [deleted]. The earliest that a deterrent/retaliatory capability could be acquired is [deleted]. Such a capability in combination with an increasing capacity for chemical defense will be the basis for the US deterrent to Soviet use. Chemical weapons, used strictly in a retaliatory role, are an effective non-nuclear option to offset most tactical advantages an enemy might hope to gain through the initiation of chemical warfare. Used in that context they would also provide additional time for political and diplomatic efforts to terminate a conflict prior to crossing the nuclear threshold.

In NATO Europe, the threat of chemical retaliation is part of the Alliance's strategy of active defense and flexible response. This strategy requires that a variety of options, including chemical retaliation, be available to bring a conflict to an early and acceptable termination at the lowest possible level of violence. However, [deleted] the NATO Allies have chosen not to maintain their own chemical weapons retaliatory stockpiles. Hence in the absence of a negotiated ban, US modernization efforts, in conjunction with improved chemical defense measures, should have a stabilizing effect on the European strategic environment.

Forward deployment and storage of chemical munitions remain sensitive issues to European governments for a variety of reasons. However, our Allies are being kept fully informed of all relevant plans and developments in our chemical weapons modernization program. Current plans do not include deploying binaries in foreign countries or increasing the existing stockpiles of US chemical weapons overseas during peacetime.

It should be emphasized that the object of the retaliatory element of the programs is to provide a safe chemical munitions stockpile of a sufficient size to deny a military advantage to any nation which might initiate chemical warfare against the US or its allies. The US does not plan to match in quantities or types the large Soviet stockpile of agents and munitions. US plans for chemical modernization

include the destruction of all unitary agents by 1994, provided sufficient stocks of binary chemical weapons are then on hand. The program to achieve this objective is now in the advanced planning stage.*

B. Soviet Systems.

The Soviets have long held a policy and doctrine that acknowledge the military utility of chemical weapons in warfare. This view persists today.

[deleted] Moreover, considerable Soviet research, development, and production of chemical, biological or toxin weapons continued after the US unilaterally ceased production of lethal chemical and biological agents in 1969. [deleted]

Assessments [deleted] reveal that a large asymmetry exists between the US and the USSR in chemical warfare capabilities. Not only does the Soviet Union maintain the world's largest and most comprehensive chemical weapons capability, but their forces are the best prepared and equipped to operate in a nuclear/biological/chemical (NBC) environment produced either by an enemy or by themselves. Unlike our own retaliatory philosophy, the Soviets consider chemical weapons an armament of mass destruction, albeit one with unique characteristics. Although the Soviets have claimed they are pursuing only a defense against chemical weapons, the size and scope of their activities demonstrate a capability to carry out offensive chemical operations. Soviet policy and doctrine promote the need for these types of weapons and their value in warfare under certain circumstances. [deleted]

* For details, see: Disposal of Chemical Munitions and Agents (NAS Press, 1984).

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IV. ANALYSIS

A. Consistency with US Arms Control Policy and Related Presidential Decisions.

As noted earlier in the Arms Control Policy section, the primary goal of US policy with regard to chemical weapons is to negotiate a comprehensive and verifiable global ban on their development, acquisition, stockpiling and transfer. As an interim measure, the US program is aimed at maintaining a credible deterrent stockpile, which would consist of binary chemical weapons, and is consistent with and supportive of this goal. The current program does not represent a decision to place greater reliance on chemical warfare nor any change in our no first-use policy with regard to lethal and incapacitating agents. Rather, it seeks only to redress the present inadequacy of the US deterrent in this area which increases the chances that chemical weapons might be used against us by tempting the Soviets to take advantage of an obvious asymmetry in military postures. The modernization of our retaliatory capability would eliminate this destabilizing asymmetry and thus aid in moving the Soviets toward serious negotiations of a comprehensive, worldwide chemical weapons ban.

Unfortunately the US-Soviet dimension is only one facet of the problem. As noted in the Arms Control Policy section, chemical weapons are now spreading dangerously in a number of regions. Although the problem is most acute in the Middle East and Asia, it threatens to spread worldwide. In 1963 around [deleted] nations had chemical weapons; now the figure has risen to at least [deleted]. In violation of international conventions, the Soviets have used chemical weapons in Afghanistan and have transferred toxic agents to Laos and Vietnam where they have been illegally employed. There is also the phenomenon of indigenous production employing technology obtained from [deleted], as is now happening in [deleted]. Whether using direct weapons transfer or indigenous production, an offensive chemical capability is within the grasp of most Third World nations should they choose to acquire that capability.

Like other weapon systems, chemical weapons might be likely to spread within regions of tension. An illustration occurs in the case of Iraq's use of chemical weapons

against Iran. In early 1984 and again from March to mid-May 1985, the Iraqis employed both mustard gas and a nerve agent [deleted] against Iranian troops. This not only was the most blatant use of chemical weapons since the 1930s, but also the first confirmed use of a nerve agent in combat. [deleted]

For the US, the implications of the spread of chemical weapons are significant. Not only does this phenomenon make the negotiations of a global ban more difficult, but we now must be prepared to face a growing chemical weapons threat in areas outside the European theater. Thus, the need for an effective US chemical weapons capability is becoming more critical.

B. Relation to Arms Control Treaties and Agreements.

The CW modernization program is not in violation of any arms control agreements. The Geneva Protocol of 1925, to which the United States is a party, prohibits the use of asphyxiating, poisonous or other gases, and of bacteriological weapons. Many parties, including the US and USSR, in ratifying that treaty, reserved the right to retaliate in kind against another state which had initially used chemical weapons in violation of the Protocol. The United States has consistently interpreted the Geneva Protocol as not applying to riot control agents. Nevertheless, the President has declared, as a matter of policy, that the US would not be the first to use riot control agents in war except in a defensive mode to save lives, and subject to his approval.

Both the United States and the USSR are parties to the 1972 Biological and Toxin Weapons Convention (BWC), which prohibits the development, production, stockpiling, acquisition, retention, and transfer of biological and toxin weapons. The BWC does not extend this injunction to chemical weapons, but calls upon its parties to continue negotiations toward such a ban. While the Soviets have maintained an offensive BW program and capability in violation of the 1972 BWC, and have been involved in the illegal production, transfer, and use of mycotoxins for hostile purposes abroad, the United States is meeting its obligations under the BWC and has destroyed its stocks of such weapons in accordance with the Convention.

C. Effect on Current and Prospective Negotiations.

The United States continues to negotiate toward a comprehensive ban on chemical weapons in both multilateral and bilateral fora. Such a ban would prohibit the retention, acquisition, or use of chemical weapons, and would require the destruction of all current stocks and production facilities. Multilateral discussions have been underway since the early 1960s and continue today as negotiations at the forty-nation Conference on Disarmament (CD) in Geneva. This effort is entirely appropriate since chemical weapons have grown into a world-wide problem. The United States participates actively in all phases of chemical weapons discussions at the CD, and has made a number of analytical and technical contributions in the areas of stockpile destruction and verification. The most important of these are embodied in the US Draft Treaty.* This document contains a number of bold verification proposals, including not only obligatory monitoring of facility and stockpile destruction by on-site personnel and instrumentation, but also a system of ad hoc and special challenge inspections to be conducted on short notice at any suspected site in order to clarify and resolve matters which might cause doubts about compliance. Our proposals enjoy substantially more support than the largely unverifiable propositions of the Soviets.

In the bilateral arena, US-USSR negotiations on a comprehensive chemical weapons prohibition began in 1977 after a year of technical consultations. These negotiations were interrupted in 1980, due to fundamental disagreements over effective verification. In 1984, the US initiated bilateral discussions with the Soviets on the margins of the Conference on Disarmament (CD), [deleted]. These discussions continued through the Summer 1985 session of the CD, and resumed in 1986. The US and Soviet commitment to continued discussion in this area was reaffirmed in the Joint Statement of President Reagan and General Secretary Gorbachev of November 21, 1985.

In these negotiations, however, the US has been placed in a position of substantial disadvantage because our chemical weapons capability has deteriorated. From a military point of view, at least, there is little obvious

* For text, see Treaty Appendix.

incentive for the USSR to work seriously towards a treaty as long as the US maintains an insufficient and outdated capability.

The US chemical modernization program is in all respects consistent with US negotiating goals. Substances used in the production of chemical weapons, whether in a factory or in a binary weapon, are covered by the appropriate clauses in the US draft treaty pertaining to inspection, declaration, and destruction. The US modernization program may not be decisive, but it will certainly have a positive effect on the effort to persuade the Soviet Union that it is in their interest to negotiate seriously to conclude an effectively verifiable treaty totally eliminating chemical weapons.

There is at least some evidence for this conclusion from the Summer 1985 session of the CD. The initial Soviet reaction to the House of Representatives' vote to authorize the production of binary weapons was negative. However, soon afterwards the Soviet delegation resumed negotiating more purposefully and in the last few weeks of the session some modest, largely procedural progress was made. In the words of Ambassador Donald Lowitz, US Representative to the Conference on Disarmament: "At this point, the Soviet Union apparently assessed the situation and concluded that, since the United States' resumption of chemical weapons production might well become a reality, it was in their interest to participate in the negotiations."

The Administration believes that continued resolve on the part of the US to modernize our chemical weapons stockpile will continue to have a positive effect on the negotiations and help lead to a comprehensive and effectively verifiable ban on this class of weapons. In the interim, the US will move to eliminate the asymmetry, minimize the possibility of the use of chemical weapons against US forces, and strengthen deterrence.

E. Verifiability.

General US policy on the verifiability of arms control agreements is summarized in the Arms Control Policy section. Chemical weapons, by their nature, pose a particularly difficult problem in this regard. Because there is a close relationship between a number of widely-known chemical warfare agents and a variety of commercially-produced chemical products, this category of armaments can be manufactured in facilities that can be converted from purely industrial purposes and that

may have little in the way of external signatures to indicate chemical weapons production. Further, the new group of toxin weapons is not only extraordinarily difficult to detect and label definitively as man-made, but also can be developed and manufactured under conditions difficult to distinguish from processes used for purely peaceful purposes. While storage of weapons containing either type of agent would probably require special security, the structures and facilities used, need not, by their basic configuration, differ dramatically from those required for other classes of ordnance. Nor would the chemical munitions themselves necessarily look different from conventionally-filled armaments of the same category. Thus verifying a chemical weapons treaty would be very difficult.

The US chemical weapons programs would, of course, present fewer verification problems in this regard than would those of the Soviets. We are the only nation which has admitted to having chemical weapons stockpiled, even though it is clear that other nations have them also. While the exact locations of some American stocks remain secret, it is wellknown that they are centralized in relatively few locations in the continental US and overseas. Finally, the existence, progress, and general nature of the US chemical modernization program is part of the public record.

Unlike the US, the Soviets have never publicly acknowledged the possession of chemical weapons. Their development programs in this area remain shrouded in secrecy. [deleted] This would further complicate the verification process.

For these reasons the US draft treaty has stipulated a comprehensive regime for verification including on-site instrumentation, regular international inspections and special mandatory challenge inspections in response to which any treaty party would be obligated to provide unimpeded access to sites on its territory designated by the challenging state. Even with such a provision, risks remain. For example, it will be very difficult to be sure whether all facilities and stockpiles have been declared or whether new facilities are being developed. The US has proposed in its draft treaty to open its relevant commercial facilities as well as all military and government-owned facilities to inspection upon request in order to ensure compliance with an eventual ban, although we have not, as yet, devised methods for safeguarding our nuclear

weapons production systems and other sensitive facilities from baseless requests for inspections.

V. SUMMARY AND OVERALL ARMS CONTROL ASSESSMENT

The global elimination of all chemical weapons is a security objective of the United States. Our strategy to achieve this goal has two complementary aspects: One deals with chemical weapons arms control; and the other is concerned with interim military requirements to deter the use of, and, if necessary, to defend against and retaliate with chemical weapons. Until such time as an effective, verifiable agreement can be concluded and implemented, an appropriate military deterrent must be provided through increased defensive measures and modernization of our outdated chemical stockpile.

Many political and technical difficulties remain unresolved, particularly the Soviet Union's unwillingness to join us in support of effective solutions to the critical verification and compliance issues associated with a chemical weapons ban. Hence, prudence argues that, prior to the achievement of such an agreement, we support a modest program to maintain a chemical weapons retaliatory capability and thereby remove the temptation for an adversary to use chemical weapons against us.

The Soviet Union maintains an active and wide-ranging chemical, biological, and toxin research and development program. These programs appear to be leading towards new agents capable of increasing the existing threat to US and Allied forces.

A US chemical modernization program with both protective and retaliatory components is consistent with US arms control policy. The nature and scope of the modernization effort is unlikely to be perceived by the Soviets as threatening their quantitative superiority in this area and is therefore unlikely to trigger either a chemical weapons arms competition or an unwillingness to participate in negotiations. In fact, the program will increase the incentives for the Soviets to negotiate an effective, verifiable treaty to ban chemical weapons forever.

SECTION IV
ABBREVIATED ANALYSES

DEPARTMENT OF DEFENSE AND DEPARTMENT OF ENERGY PROGRAMS

A. Previously Submitted ACIA.

The following Arms Control Impact Analyses address programs, which have continuing arms control implications, but have had no significant changes in funding, program direction, policy, or international developments that would revise the Administration's analysis as previously forwarded. The need for updated ACIA will be reevaluated as these programs evolve.

Antiship Missile Systems

PE 63717N	Command and Control Systems (Advanced)
PE 64353N	Vertical Launching System
PE 64367N	TOMAHAWK Missile System
Procurement	AGM-84A HARPOON
Procurement	BGM-109 TOMAHAWK
Procurement	Surface TOMAHAWK Support Equipment

Large-Area Ocean Surveillance Systems

PE 24311N	Undersea Surveillance Systems
PE 24313N	SURTASS
PE 63788N	Deployable Surveillance Systems
PE 64789N	Surveillance Towed-Array Sensor
Procurement	SURTASS
Procurement	SOSUS

Strategic Warning and Attack Assessment

PE 12313F	Ballistic Missile Tactical Warning/ Attack Assessment Support
PE 12411F	Surveillance Radar Stations/Sites
PE 12417F	CONUS Over-the-Horizon Radar System
PE 12423F	Ballistic Missile Early Warning System (BMEWS)
PE 12431F	Defense Support Program (DSP)
PE 31357F/12433F	Integrated Operations Nudets Detection System (IONDS)

PE 63425F
Procurement
Procurement

Advanced Warning System
Defense Support Program (DSP)
IONDS

Advanced Isotope Separation and Centrifuge Enrichment

DoE 81-T-502

Advanced Isotope Separation

NAVSTAR Global Positioning System

PE 35164F	NAVSTAR Global Positioning System (GPS) (User Equipment)
PE 35165F	NAVSTAR Global Positioning System (GPS) (Space/Ground Segments)
PE 64777N	NAVSTAR Global Positioning System (GPS) (Navy)
PE 64778A	NAVSTAR Global Positioning System (GPS) (Army)
PE 64778F	NAVSTAR Global Positioning System (GPS) (Air Force)
Procurement	NAVSTAR Global Positioning System (GPS) (Air Force)

Fleet Air Defense

PE 64303N	AEGIS Area Air Defense
PE 64352N	Surface-Launched Weaponry, Ship Systems
PE 64353N	Vertical Launching System
PE 64365N	STANDARD Missile-2 (N)
PE 64366N	STANDARD Missile Improvements
DoE	W81 SM-2 Warhead
Procurement	STANDARD missiles
Procurement	Surface Missile System Ordnance
	Alteration (SMS ORDALTS) -
	Area Air Defense TERRIER
Procurement	SMS ORDALTS - Area Air Defense TARTAR

Inertial Confinement Fusion

DoE

Inertial Confinement Fusion (ICF)

Short-Range Nuclear Forces

DoE	W79-1 warhead (8-inch)
LoE	W82 warhead (155mm)
Procurement	8-inch nuclear projectile

Intermediate-Range Nuclear Forces

PE 64311A	PERSHING II (PII)
PE 64362F	Ground-launched Cruise Missile (GLCM)
DoE	W85 PERSHING Warhead
DoE	W84 GLCM Warhead
Army Procurement	PERSHING
Air Force Procurement	GLCM Missile

Antisubmarine Warfare Development Programs

PE 63367N	Submarine Antisubmarine Warfare Standoff Weapon (ASW/SOW)
PE 63634N	Tactical Nuclear Development
PE 64355N	Vertical Launch Antisubmarine Rocket (VLA)
PE 64610	MK-50 Torpedo
DoE	Antisubmarine Warfare Standoff Weapon (ASW/SOW) Nuclear Depth Bomb

Sea-Launched Cruise Missiles

PE 64367N	TOMAHAWK
PE 64370N	SSN 688 Class Vertical Launch System
PE 64353N	Vertical Launch System
Procurement	BGM-109 (TOMAHAWK Cruise Missile)
DoE	W80-0 SLCM Warhead

B. Other Programs Which Meet Congressional Criteria for an Arms Control Impact Statement.

The activities within the programs listed below are primarily associated with one or more of the following:

- Programs in too early an exploratory research and development stage to determine with precision their possible arms control implications.
- Programs providing continuing normal support for existing missions or deployed operational systems and organizations.
- Production and procurement of a developed weapon system; non-nuclear munitions, cartridges, projectiles, rockets, etc., and associated equipment; spares and repair parts; associated electronic, communications, training, and support equipment; support, storage, industrial and test facilities construction and operations; utility and specialized vehicles, ships, tanks, and aircraft; miscellaneous production charges, first destination charges and outfitting costs. In themselves, none of the activities in this category is judged to have a significant impact on arms control policy or negotiations.
- Modification or modernization of an already procured system which does not significantly alter the characteristics of the system from an arms control standpoint.
- Programs which were analyzed as in-depth statements in previous years and found to have little, if any, additional arms control impact.
- Programs involving miscellaneous research, development, testing, and evaluation of programs not otherwise categorized, which are judged to have marginal, if any, impact on arms control policy or negotiations.

DEPARTMENT OF DEFENSE PROGRAMSARMY (RDT&E)Defense Research Sciences

PE 61102A

RDT&E funds to support research in the physical, engineering, environmental, biological-medical, and behavioral-social sciences. Program element is the foundation for investment in future materiel developments and combat support needs.

Laser Weapon Technology

PE 62307A

This program provides the exploratory development, high-energy laser technology base for potential Army mission applications in the close combat, air-defense, and other promising mission areas through advancements in laser devices and components, acquisition and fire control, beam control and optics, and the damage and effects data base.

DoD Software Initiative (STARS)

PE 63756A

STARS (Software Technology for Adaptable, Reliable Systems) is a program to reduce the labor intensiveness and latent defects associated with mission-critical defense software. It addresses all facets of software including acquisition, management, performance, and support. The program is developing an automated software "factory" concept for weapon systems software. Use of the automated software factory will result in order-of-magnitude increases in productivity and corresponding reductions in software defects.

Special Program

PE 12814A

Limited access program.

Classified Program

PE 12821A

Limited access program.

Anti-Tactical Missile System

PE 63302A

Includes both the near-term and long-term phases to define an overall concept for countering the total tactical missile threat. This approach will include surveillance, target acquisition, battle management, countermeasures, terminal defense and counter-strike.

Nuclear Munitions and Radiacs

PE 63604A

Projects in this program comprise the Army's nuclear system advanced development efforts, and also fund the management and engineering support structure required to interface with the DoE and other weapon system developers. Projects include: nuclear development support, Nuclear Effects Support Team (NEST), and radiac equipment advanced development.

Advanced Anti-Tank Weapon

PE 63612A

This program will provide a man-portable weapon designed to defeat armored vehicles and engage other hard point targets.

Armament Enhancement Initiative
(AEI)

PE 63639A

Limited access program.

Tactical Electronic
Countermeasures System

PE 63755A

Program supports the validation/advanced development of electronic warfare systems to assist brigade, division, and corps commanders in denying, destroying, disrupting, and deceiving hostile command and control communications and radars. A complementary mix of airborne and high-survivability ground assemblies will provide 24-hour, all-weather coverage in depth.

Aircraft Propulsion Systems

PE 64216A

This program provides for the full scale development and qualification of an advanced technology engine in support of the light Rotorcraft Program and for advances in the area of flight safety, reliability, maintainability, durability,

survivability, and fuel efficiency critical to the combat mission capability of Army aviation.

Advanced Technology Light
Helicopter Series

PE 64223A

This program provides RDT&E funds for the LHX, which is required to replace the Army's tactically obsolete light helicopter. The LHX will incorporate new technology which is presently being studied and demonstrated.

PATRIOT (SAM-D)

PE 64307A

RDT&E funds for the PATRIOT system. PATRIOT is a long-range surface-to-air missile system which will replace all the current NIKE HERCULES and some HAWK systems. PATRIOT uses a multifunction, electronically scanned phased array radar, automatically controlled by a digital computer, and a guidance system incorporating a track-via-missile terminal phase.

Joint Tactical Fusion Program

PE 64321A

The program objective is to develop and field an all-source analysis system which will provide the tactical commander with a highly automated capability to analyze, correlate, fuse, and report intelligence data from numerous tactical and strategic sensor systems. System also provides capability to manage and control intelligence/electronic warfare resources. FY1987 program continues with the objective of fielding baseline systems.

Army Tactical Missile System
(ATACMS) (Formerly Corps
Support Weapon System)

PE 64324A

The ATACMS is envisioned as an improved missile system to attack targets of importance to the corps at ranges beyond the capability of cannons and rockets. The Army is developing the T-16 or T-22 missile for an IOC as early as 1987. FY1987 program will continue the development of joint weapons interface, ground/air launch, and support systems, and will continue development/operational tests to evaluate systems performance.

Nuclear Munitions

PE 64603A

This program supports the development of a modern nuclear projectile to replace the 155mm nuclear projectile currently available for NATO forces.

Remotely Piloted Vehicles

PE 64730A

Program will develop a remotely piloted vehicle system to perform target acquisition, aerial reconnaissance, artillery adjustment missions, and battlefield post-strike assessment. Laser designation will be provided for all Army and Air Force laser-guided munitions. FY 1987 program will include developmental and operational testing.

Division Air Defense
Command and Control

PE 64741A

Program is designed to provide a new short-range air defense command and control system. This will be accomplished through the use of digital processing of target information, improved dissemination of air-threat warning and weapon control orders, and the introduction of additional instrumentation at the gunner position to allow timely and accurate presentation of appropriate battle information. FY 1987 program will continue engineering development of the system.

Tactical Electronic
Countermeasures

PE 64750A

This program encompasses the development of tactical electronic countermeasures equipment and systems mounted in both ground vehicles and aircraft.

Classified Program (ENG)

PE 64754A

Limited access program.

Joint Surveillance/Target
Attack Radar System

PE 64770A

Program objective is to develop a radar to be mounted on the USAF's C-18 airframe that will provide the capability to locate, track, and attack targets beyond ground line-of-sight.

Target data will be distributed to ground stations at all user echelons via secure data link. The joint system will locate moving targets at extended ranges during the day or night, and under most weather conditions.

Combat Vehicle Improvement
Program

PE 23735A

Program provides for early initiation of planned operational performance and reliability, availability, maintainability, and durability improvements beyond the original performance requirements, which are responsive to anticipated threat changes and capitalize on technology opportunities.

155mm Self-propelled Howitzer
Improvements

PE 23743A

Program provides for the maintenance of a responsive, survivable, reliable, and lethal 155mm self-propelled howitzer system to provide close indirect fire support through the 1990s and beyond.

Kwajalein Missile Range

PE 65301A

Includes manpower authorizations, peculiar and support equipment, necessary facilities and the associated costs specifically identified and measurable to RDT&E and minor construction funds. Kwajalein Missile Range (a national range) has the mission of providing support for strategic offensive and defensive missile testing and related developmental test programs.

Support of Development Testing

PE 65702A

Provides funding to subordinate activities of the US Army Materiel Command (AMC) for indirect support of development test and evaluation (other than test and evaluation conducted at AMC facilities included in the major range and test facility base). Projects include: Cold Regions Test Center; Tropic Test Center; test design and evaluation; meteorological support to RDT&E activities; field smoke assessment; R&D Field Support Activity; Aviation Development Test Activity; US Army Test Facilities Register; US Army Test and Evaluation Command Instrumentation and Development; and TECOM test methodology.

Support of Operational Testing

PE 65712A

Provides funds for the conduct of operational testing of Army systems under development so as to support decision-making related to materiel acquisition programs. The program consists of nine projects that provide for the recurring costs of operating the TRADOC test boards; for the direct costs of operational tests of developmental materiel prior to production; for an economical test vehicle via quick-reaction testing of materiel issues related to potential Army needs; and for development of instrumentation and threat simulators for TRADOC/OTEA test organizations.

Program-Wide Activities

PE 65801A

Includes funding for civilian and military manpower and other costs incurred for the operation and maintenance of RDT&E-operated Army headquarters and installations (other than major range and test facility bases) and for logistical and other service support to R&D commands designated as Army Management Headquarters Activities. Also includes support of other administrative activities (e.g., standardization groups and liaison officers) not identifiable with specific research and development projects financed under other program elements. Includes procurement of laboratory special purpose equipment and ADP equipment in support of R&D activities.

AMC Major Range/Test Facilities

PE 65804A

Includes civilian and military manpower authorizations for necessary facilities, supplies, test instrumentation and associated costs and base operations at five major DoD development test activities under the US Army Materiel Command (AMC). Includes costs of modernizing Dugway Proving Ground.

DoD High Energy Laser Systems
Test Facility

PE 65806A

This program supports the establishment and operation of a facility that, when completed, will support Army, Navy, Air Force, DNA, and DARPA generic high-energy laser (HEL) testing. It provides for acquisition, installation, and checkout of instrumentation and facility support equipment, for operation and maintenance of the Mid-Infrared Advanced Chemical Laser, Multi-Purpose Chemical Laser and other experimental test equipment after completion by DARPA, and for recurring

operating costs not specifically identified to a particular laser system or project.

Industrial Preparedness

PE 78011A

The program encompasses the Army's Manufacturing Methods and Technology (MMT) effort, Industrial Modernization Incentives Program (IMIP), and Military Adaptation of Commercial Items (MACI) effort. MMT program provides improvements to manufacturing processes, techniques, and equipment. IMIP performs the dual role of modernizing the defense industrial base while defining and prioritizing needed manufacturing technology projects. MACI effort conducts operational feasibility evaluation of commercial items which are to be used as replacements for standard items in the Army inventory.

ARMY (PROCUREMENT)RC-12D GUARDRAIL Reconnaissance
Airplane

Procurement of RC-12D GUARDRAIL reconnaissance aircraft for the fourth Improved GUARDRAIL V system. GUARDRAIL aircraft will provide supported commanders at Division and Corps level with real-time intelligence information. The RC-12D is a twin-engine, turboprop airplane equipped with a signal intelligence system which intercepts, locates, and classifies target signals.

Helicopter, Electronic, EH-60A
(QUICK FIX)

Procurement of EH-60A QUICK FIX Helicopters. The EH-60A utilizes the BLACKHAWK airframe to employ on-board jammers for electronic warfare and is designed to identify, locate, listen, and disrupt enemy C3.

AH-64 Attack Helicopter

Procurement of AH-64 advanced attack helicopters, the twin-engine, fully-integrated anti-armor weapon system capable of destroying tanks and other armored vehicles under day/night and adverse weather conditions. Aircraft employs HELLFIRE antitank missiles.

UH-60A BLACKHAWK

Procurement of UH-60A BLACKHAWK helicopters, the twin-engine, squad-carrying helicopter. UH-60A will enhance tactical mobility with increased speed, lift-capacity, range, maintainability, and survivability.

AH-1S Attack Helicopter (COBRA TOW)

Provides for modification and upgrade of the AH-1S attack helicopter in accordance with provisions in the COBRA Flight Life Extension Program.

CH-47 Cargo Helicopter (CHINOOK)
(Modifications)

Provides funds for continuation of CHINOOK modernization which provides air mobility for artillery weapons, ammunition, bulk fuels, troops, general cargo, medical evacuation, and recovery of downed aircraft. Modifications include: new fiberglass rotor blades; new engines, transmission, and drive systems; modularized hydraulics; electrical systems; advanced flight control system; triple hook cargo system; and an auxiliary power unit.

Army Helicopter Improvement Program
(AHIP) (Modifications)

Provides funds for long-lead-time items for conversion of OH-58A helicopters to AHIP configuration. Items include: transmissions, gearboxes, main rotor masts, material for main rotor blades, electrical components, sensors, micro-electronic parts, engines, and avionics.

Spares and Repair Parts (Aircraft)

Continuing procurement of initial spares and repair parts, replenishment spares and repair parts, and avionics spare parts for Army aircraft.

Avionics Support Equipment

Provides for avionics support equipment including communications equipment and night vision goggles.

Synthetic Flight Training Systems

Provides funds for the procurement of aviation flight simulators. FY 1987 funds will purchase four UH-66 simulators and three AH-64 Combat Mission Simulators.

CHAPARRAL Missile System

Provides for the initial procurement of TOWED CHAPARRAL fire units for the light forces and direct support equipment for the National Guard. Provides for the first procurement of

300 missiles to upgrade CHAPARRAL Missiles with infrared counter-counter measures capability.

PATRIOT (SAM-D)

Continues procurement of PATRIOT missiles and fire units. PATRIOT is an advanced surface-to-air missile system with a high single-shot kill probability, and a capability for operation in an ECM environment. Its mission is to provide area air defense of the division, corps and high-value assets in the rear area. PATRIOT will replace the HAWK and NIKE HERCULES.

STINGER

Continues procurement of STINGER missiles and ground support equipment. The STINGER is a man-portable air defense missile system that provides self-defense to forward deployed company-size combat units.

Laser HELLFIRE System

Provides funds for the continued procurement of the HELLFIRE missile and associated support equipment. HELLFIRE has been developed as the primary anti-armor weapon for the AH-64 Attack Helicopter.

TOW (BGM-71A) (BTM-71A)

Provides funds for the continued procurement of TOW missiles and ground support equipment. The TOW missile is designed to defeat current and future enemy armored vehicles.

Multiple Launch Rocket System (MLRS)

Continued procurement of MLRS rockets and associated ground support equipment. MLRS is a self-propelled multiple rocket launcher system designed to counter enemy field artillery and air defense systems and supplement cannon artillery.

Modifications to Missile Systems

Modifications to missile systems to improve their capabilities and extend their service life.

Spares & Repair Parts (Missiles)

Continuing procurement of initial spares and repair parts, replenishment spares and missiles for Army missile systems.

Bradley Fighting Vehicles

Procurement of infantry and cavalry fighting vehicles. Systems are full-tracked, armored vehicles which provide mechanized infantry and cavalry units with protected cross-country mobility and improved vehicular mounted firepower. Vehicles are designed to be compatible with the new M1 main battle tank in terms of speed and range (not armor).

Field Artillery Ammunition

Support Vehicle (FAASV)

Continued procurement of FAASVs as replacements for the current unarmored ammunition support vehicles in self-propelled field artillery units in Europe. The FAASV provides armor protection for the ammunition and crew, and on-board ammo handling equipment to improve fire support responsiveness and reduce manpower intensity of ammunition handling.

Recovery Vehicle, Medium, Full-Track, M88-A1

Continued procurement of M88-A1s to meet the needs of armor units for required tank recovery capability.

Abrams Tank, M1A1

Continued procurement of M1A1 main battle tanks. The M1A1, a replacement for the M60 series tank, will counter the current enemy threat and has growth potential to be effective well into the 1990s.

Fire Support Team Vehicle (FISTV)
(Modification)

Continued procurement of kits required to convert M113 armored personnel carriers to FISTV. FISTV will provide protection for the Ground Laser Locator Designator (GLLD) and will provide the fire support team with an improved capability to coordinate all indirect fires, to include laser guided munitions in support of maneuver forces.

M-60 Series Tank (Modification)

Procurement of kits to convert M60A1 to M60A3 configuration. The M60A3 employs a solid-state computer, laser range finder, and thermal sight.

M-1 Series Tank (Modifications)

Procures various modification kits for the M-1 series tank.

Spares and Repair Parts (Weapons and
Tracked Combat Vehicles)

Procurement of initial and replenishment spares and repair parts related to tracked combat vehicles.

Production Base Support (TCV-WTCV)

Rehabilitate and provide plant equipment for current and mobilization production industrial facilities projects; for layaway of industrial equipment excess to current production requirements; and for depot maintenance plant equipment for repair and overhaul capability.

Spares and Repair Parts (Weapons and
Tracked Combat Vehicles/Support
Equipment and Facilities)

Procurement of initial and replenishment spares and repair parts related to weapons and other combat vehicles.

Production Base Support (WOCV-WTCV)

Provides modernization at Watervliet and Rock Island Arsenals, annual support for Ethan Allen Firing Range, and modernization of small arms manufacturing facilities at Maremont Corporation and plant equipment packages for the Cannon Production base.

Nuclear Weapons Support Materiel

Includes funding for projectiles and support materiel.

Projectile, Nuclear 155mm

Funding for 155mm Nuclear Projectiles

Conventional Ammunition Procurement
(Various)

Provides for procurement of conventional ammunition of various types and categories for the US Army. Includes: cartridges, fuzes, projectiles, primers, small missiles and rockets, propellents, mines, demolitions, hand grenades, and flares.

Provision of Industrial Facilities
(Ammunition)

Provides for establishment, rehabilitation, modernization, and expansion of government-owned facilities to support production of ammunition.

Chemical Demilitarization Program

Program provides for the destruction of outdated chemical weapons.

HIMOB, Multipurpose Wheeled Vehicle
(HMMWV)

Procurement of a single family of vehicles, utilizing a common chassis with various body configurations, to meet Marine Corps, Air Force, and Army requirements. Vehicle is designed to replace the current family of 1/4 - 1-1/4 ton vehicles.

Truck, 5T, 6x6, All Body Types

Procurement of 5-ton wheeled tactical vehicles. Vehicle is produced in 7 body styles: cargo, dump, tractor, van, wrecker, stake, and bolster.

Truck, 10T, 8x8, All Body Types

Procurement of 10-ton wheeled tactical transport vehicles. Truck is required to transport ammunition, petroleum, and missile systems, and can be used for recovery of other heavy wheeled support vehicles and combat systems. Major systems supported include MLRS, PERSHING II, and PATRIOT.

Spare and Repair Parts(Support Equipment and Facilities)

Procurement of initial and replenishment spares and repair parts related to tactical and support vehicles.

Telecommunications Equipment

Provides support for both tactical and strategic communications worldwide and includes joint tactical communications; combat support communications; EUCOM command, control, and communications systems; and communications security equipment. These equipments are essential to field, and to sustain in the field, the combat elements of the Army.

Other Electronic Systems/Equipments

Provides for other electronic systems and equipment including intelligence support, automatic data processing equipment, electronic warfare, tactical electronics, and support equipment and facilities. The equipment in these categories is required to sustain troops in combat and to provide electronic combat multiplier advantages and protection to the individual soldier, and to sustain the production base exploiting the latest developments in miniaturization, solid-state circuitry, and modular fabrication.

Mask, Protective, NBC

Continues replacement of worn-out, obsolete, and over-age protective masks currently in the inventory with XM40 masks.

M-9 Armored Combat Earthmover

Continued procurement of the Armored Combat Earthmover required by combat engineers to provide essential support to the fighting force.

Water Purification Unit

Continued procurement of a modern water purification capability for troops in field conditions.

Deployable Medical System (DMS)

Provides for the procurement of medical equipment which is the initial issue quantity for new or existing tactical field medical units in the approved force structure, procurement of field medical equipment to be placed in POMCUS, and the acquisition of field medical investment equipment to replace wornout, obsolete, or uneconomically repairable equipment, or field unit shortages.

Medical Support Equipment

Procurement of equipment required to support health care programs in fixed TDA/MTDA medical facilities/activities worldwide. Includes initial and replacement equipment for Army health care facilities.

Landing Craft, Utility

Continues procurement of Landing Craft, Utility, one of the watercraft required to transfer cargo from in-stream ship to shore.

Generators and Associated Equipment

Continues procurement of interchange generators required to support fielding of major weapon systems and communications equipment. In addition, begins to replace over-age, obsolete, maintenance-intensive generators that are being removed from the inventory.

Spares and Repair Parts

Procurement of initial replenishment spares and repair parts.

Training Devices, Non-System

Continues procurement of laser engagement simulation systems which allow for improved training effectiveness and cost-efficiency. Continues the procurement of the Infantry Remote Target System that will standardize range training.

NAVY (RDT&E)Defense Research Sciences

PE 61153N

A continuing program to conduct research in the physical, engineering, environmental, and life sciences in order to obtain information and understanding which can lead to discoveries of potential importance to the Navy, the solution of Navy technical problems, and the improvement of Navy operations.

Nuclear Propulsion Technology

PE 62342N

A comprehensive exploratory program directed toward the development, testing, and application of advanced technologies for potential use in Navy nuclear propulsion plants.

Airborne Electronic Warfare
Equipment

PE 63206N

Provides for the combat survival of tactical Navy and Marine Corps aircraft through the development of essential, advanced-technology, self-defense electronic warfare equipment and off-board electronic warfare expendables.

VTXTS

PE 63208N

Provides undergraduate jet pilot training for prospective carrier-based Navy/Marine Corps pilots and selected international students to meet aircrew requirements in the 1990s and beyond.

JVX

PE 63256N

Program is designed to develop, test, evaluate, procure, and field a tilt-rotor, vertical takeoff and landing aircraft for joint service application.

A-6F Improvement

PE 63257N

Provides for the upgrade of the A-6F configuration to enable it to perform adequately in the adverse environment posed by the surface-to-air and air-to-air defensive threat anticipated for the 1990s and early 2000s.

RETRACT YELLOW

PE 63315N

Limited access program.

Advanced Surface-to-Air Missile
(ASAM)

PE 63318N

Consolidates the Navy's new long-range anti-air warfare efforts under a single program to insure a coordinated effort which emphasizes commonality, affordability, and executability and is responsive to recent Outer Air Battle studies and anti-air warfare appraisals.

Surface Ship Torpedo Defense

PE 63506N

Provides additional torpedo defense equipment capable of detecting and countering various types of torpedoes in order to further improve ship survivability.

Shipboard Damage Control

PE 63514N

Covers the advanced development of equipment, systems, and engineering data and full-scale weapons effects simulation that will provide protection of ships and their embarked personnel from conventional, nuclear, chemical, or biological weapon effects and enable the ship to continue performing its assigned combat missions at an effective level.

PILOT FISH

PE 63525N

Limited access program.

Submarines (Advanced)

PE 63561N

Advanced submarine development programs which include: atmosphere control systems, propulsion safety, efforts to extend operational depths of future submarines, damage control equipment, shock hardening, and submarine propellers.

and communication jamming equipment as well as the development of an integrated electronic warfare suite for tactical aircraft.

Electronic Warfare Simulator Development PE 64255N

Consolidates the design, fabrication, and integration of Navy direct radar simulators in one program element for increased managerial emphasis and coordination.

Aircraft Engine Component Improvement Program PE 64268N

A continuing program to provide engineering support required for improvements essential to ensure satisfactory performance of aircraft engines in the fleet.

Standard Missile (SM) and Improvements PE 64365N

Supports the development of the nuclear variant for the Standard Missile - 2 (medium range) block II missile and combat systems integration for SM-2N in AEGIS/VLS ships.

Standard Missile (SM) and Improvements PE 64366N

Supports the development of the conventional variant for the Standard Missile - 2 (medium range) block II missile.

New Threat Upgrade PE 64372N

Program is designed to improve the tactical TERRIER and TARTAR systems on guided-missile cruisers and destroyers in order to counter major and projected antiship missile threats.

Submarine Sonar Development (Engineering) PE 64503N

Encompasses engineering development of attack submarine sonar improvements in order to maintain an acoustic advantage over new, quieter threat submarines.

Advanced Nuclear Reactor
Component System Development

PE 63570N

Program element is directed toward the advanced design, development, and testing of new and improved components and their related systems for use in new and existing naval nuclear propulsion plants.

CHALK EAGLE

PE 63576N

Limited access program.

DDG-51

PE 63589N

Program provides funds to perform combat system engineering development as well as development of selected systems and subsystems for the new multi-mission guided-missile destroyer.

Joint Advanced Systems

PE 63591N

Limited access program.

LINK SPRUCE

PE 63744N

Limited access program.

Special Processes

PE 63787N

Limited access program.

AV-8B Engineering

PE 64214N

The AV-8B is an improved vectored-thrust aircraft that will meet the Marine Corps requirement for a light attack aircraft to provide responsive offensive airpower that can operate from austere forward sites in direct support of ground forces.

Airborne Electronic Warfare
Engineering

PE 64224N

Provides for development of, or improvements to, self-protection countermeasure systems, threat warning systems,

Enhanced Modular Signal
Processor

PE 64507N

Program designed to meet the signal processing requirements for combat systems indigenous to all warfare areas well into the twenty-first century. Processor will form the basic building block of these Submarine Advanced Combat Systems, as well as a number of other acoustic and non-acoustic sensor-based systems.

Submarine Hull Array Development
(Engineering)

PE 64520N

Engineering development of hull-mounted sonar arrays for attack submarines.

Submarine Advanced Combat
System (Engineering)

PE 64524N

Provides for development of an evolutionary combat system for attack submarines; intended to provide the ships with clear tactical superiority in engagements with improved threat platforms.

Submarine Tactical Warfare
Systems (Engineering)

PE 64562N

Provides the engineering development to integrate improved weapons, sensors, and capabilities with the SSN combat control system Mk 1 and Mk 117.

Ship Development (Engineering)

PE 64567N

Program supports the engineering development of specific, selected ship systems or subsystems which are required for the effective design of ships in the Navy's Ship-Building Program. In addition, program provides funds for the operation of test sites.

Shipboard Electronic Warfare
Improvement

PE 64573N

Improvements address the full gamut of surface EW, including required improvements to the AN/SLQ-32(V) EW Systems and development of the Advanced Electronic Warfare System.

Marine Corps Assault Vehicles

PE 64656M

Program completes integration and testing of command/control vehicle and continues evaluation of the air defense, air assault gun version.

MK-48 Advanced Capability Torpedo

PE 64675N

Provides funds to accomplish design, engineering development, test, and evaluation of the submarine-launched MK-48 Advanced Capabilities Torpedo to counter the Soviet threat through the year 2000.

Command and Control System
(Engineering)

PE 64711N

Continues evolutionary upgrade to the Navy's Command, Control, and Communications network.

F/A-18 Squadrons

PE 24136N

A continuing program designed to successfully integrate the F/A-18 weapon system into the Fleet.

Fleet Telecommunications
(Tactical)

PE 24163N

Supports the evolutionary development of Navy Fleet Telecommunications. Additionally, it will provide replacement, state-of-the-art equipment to maintain Fleet readiness.

Tactical Information Systems
(JTIDS)

PE 25604N

Provides funds for the Joint Tactical Information Distribution System and integrated communication, navigation, and identification systems, which will provide secure, jam-resistant communication in aircraft and ground command and control applications.

F-14D

PE 25667N

Provides for the operational improvement of F-14D squadrons in order to counter the projected threat to the year 2000.

Electronic Warfare Counter
Response

PE 25674N

Program element funds continuing development of electronic warfare systems for the EA-6B. Provides for the electronic countermeasure response to new generation weapon systems.

Operational Reactor Development

PE 25675N

Provides for testing, evaluating, modifying, and improving components and systems in operating reactor plants.

Command, Control, Communications
Systems

PE 26626M

Develops and improves operational Marine Corps C³ systems to achieve inter/intra-operability and total integration of tactical C³ and related subsystems.

Special Activities Support

PE 34111N

Limited access program.

Target Systems Development

PE 64258N

Provides for the development of target systems and associated electronic and infrared subsystems necessary to duplicate or simulate significant threat characteristics of representative targets. These target systems are used to evaluate Navy weapon systems performance throughout their life cycle.

Atlantic Undersea Test/
Evaluation Center

PE 65852N

A continuing program which provides the operational maintenance support for the Navy's only secure and fully instrumented anti-submarine warfare test and evaluation range.

RDT&E Laboratory/Facility
Management Support

PE 65861N

A continuing program which provides for certain program-wide management and operations costs at specified R&D laboratories and other facilities.

RDT&E Ship/Aircraft Support

PE 65863N

Includes RDT&E funds to provide for operation and maintenance of ships and aircraft assigned for support of weapon system RDT&E projects.

Test/Evaluation Support

PE 65864N

The annual institutional funding for the operation, maintenance, and test instrumentation and separate improvement at four of the six Navy/DoD major range and test facility base activities. These facilities include Pacific Missile Range, Naval Air Test Center, Naval Air Propulsion Test Center, and Naval Weapons Center Ranges. In addition, investment costs at Lakehurst Naval Air Station are funded within this program element.

Defense Meteorological Satellite
Program

PE 35160N

Program element provides for the development, production, and operation of space sensors, associated equipment, and processing algorithms for the measurement of atmospheric parameters in support of Navy tactical operations as part of the Defense Meteorological Satellite Program. Program element also includes the space segment of the Navy Remote Ocean-Sensing System.

Manufacturing Technology

PE 78011N

Provides the resources to reduce acquisition and support costs of weapon systems by developing and implementing new and advanced methods of manufacturing and remanufacturing.

NAVY (PROCUREMENT)A-6E (INTRUDER)

Continued procurement of day/night, all-weather, carrier-based attack aircraft, capable of delivering nuclear and non-nuclear weapons.

EA-6B (PROWLER)

Continued procurement of the four-place, twin-engine, advanced electronic warfare aircraft which provides protection to Navy strike aircraft through a computer-controlled, electronic surveillance control system and high-power jamming transmitters.

AV-8B (V/STOL)

Continued procurement of V/STOL aircraft with twice the range or payload of the current HARRIER, capable of delivering air-to-ground weapons under day and night conditions.

F-14A (TOMCAT)

Continued procurement of carrier-based, air superiority/fleet air defense fighters capable of air-to-air combat and air-to-surface attack missions. System has visual attack and all-weather capability.

F-18 (HORNET)

Continued procurement of single seat, carrier-based, high-performance, multi-mission strike aircraft. Missions include fleet air defense, air superiority, and air-to-ground interdiction.

CH/MH-53E (SUPER STALLION)

Continued procurement of the three-engine, shipboard-compatible, Navy and Marine Corps heavy-lift helicopter. Designed for heavy cargo/troop/transport in Marine Corps missions. Navy missions include vertical on-board delivery for Fleet replenishment.

AH-1T (SEA COBRA)

Program funds continue procurement of an attack helicopter designed to provide high-speed maneuverability and ground-fire suppression during aerial and ground escort operations, landing zone preparation, and aerial search and destroy missions.

SH-60B (SEAHAWK)

Continued procurement of a new sea-based helicopter configured to operate from destroyer-type ships. The SH-60B is optimized for antisubmarine warfare with a secondary mission of antiship surveillance and targeting.

CV ASW Helo

Authorization is requested to initiate procurement for a new, advanced CV inner-zone antisubmarine warfare helicopter to replace the aging SH-3.

P-3C (ORION)

Land-based, multi-engine, turboprop, maritime patrol aircraft with primary mission of ASW. Secondary missions are maritime reconnaissance, aerial mining, antiship warfare, and intelligence collection.

E-2C (HAWKEYE)

Continued procurement of the carrier-based, twin-engine, turboprop aircraft designed for airborne early warning of approaching enemy units and for vectoring interceptors into attack position.

C-2A (GREYHOUND)

Continued procurement of a personnel/cargo, transport-type aircraft capable of all-weather carrier operations.

T-34C (TRAINER)

Procurement of a single engine, turboprop aircraft to train student aviators in primary flight techniques.

Aircraft Modifications

Procurement of a variety of modifications to several aircraft, including airframe and avionics changes, improved weapons capability, and survivability improvements.

Common ECM Equipment

Provides funds for development and procurement of radar warning receiver system and related systems and EW systems improvements.

Spares and Repair Parts (Aircraft)

Repairable parts procured in support of operating forces and industrial activities within the naval aviation establishment. Includes all Navy aircraft.

Common Ground Equipment

Common ground equipment includes avionics support, aircraft systems trainers, training aids and devices, and miscellaneous aircraft maintenance and ground support equipment.

Aircraft Industrial Facilities

Provides for calibration equipment for Navy Standards and Calibration Laboratories.

Other Production Charges

Provides funds for miscellaneous production support and testing services, aircraft cameras, various equipment for US Coast Guard aircraft, and aircraft pods and instrumentation packages supporting tactical aircrew combat training and mobile sea-range systems.

AIM/RIM-7F/M SPARROW

Continued procurement of a conventionally armed, radar-guided (SPARROW-III) missile used in air-to-air and ship-to-air weapon systems now in the inventory.

AIM-9L/M SIDEWINDER

A product improvement of the AIM-9L short-range, air-to-air missile which provides for improved counter-countermeasures capability and an improved ability to acquire targets in a high-IR cluttered background.

AIM-54A/C PHOENIX

Continued procurement of the conventionally armed, air-to-air, guided missile carried aboard the F-14 for anti-air warfare/fleet air defense in order to replenish training rounds expended and to outfit new squadrons.

AGM-88A HARM

Continued procurement of the high-speed, air-to-surface, anti-radiation, HARM missile designed to suppress or destroy land- and sea-based radars supporting enemy air defense systems.

Standard Missiles

Provides the fleet with medium-range, anti-air warfare capability against aircraft and missiles, and a surface-to-surface capability against ships.

RAM

The Rolling Airframe Missile is a surface-to-air, solid-propellant, rolling airframe missile, complementary to existing point defense systems to counter anti-ship capable missiles.

HELLFIRE

Procurement provides the Marine Corps with an effective anti-armor weapon for use on AH-1T/J helicopters.

MAVERICK (Laser and IIR)

Procurement of a forward-fired, guided missile which can be employed from land- or carrier-based aircraft against a variety of land and sea targets.

Aerial Targets

Procurement of aerial targets to provide realistic presentations of potential threats to support Navy training in the use of missiles and antiaircraft guns.

Fleet Satellite Communications

Continued procurement of satellites to be placed on geostationary orbits to provide communications to all Navy ships plus a vital command-control service to all anti-submarine warfare platforms, Fleet Ballistic Missile Submarines, aircraft carriers, cruisers, and other selected ships and submarines.

Ordnance Support Equipment

Procurement of the Vertical Launch System Program, SUBROC Fleet Support Program, Fleet Support for the Standard Missile MR SM-1 and ER SM-1.

Torpedo MK-48 ADCAP

Continued procurement of submarine-launched, high-speed acoustic torpedos effective against fast, deep-diving, high performance submarines and surface ships.

Torpedo MK-46 (NEARTIP)

Provides for the continued procurement of the MK-46 lightweight ASW torpedo launched from surface ship torpedo tubes, ASROC launchers, and fixed-and rotary-wing aircraft.

Torpedo MK-46 Modifications

Procurement funds for NEARTIP modification kits to be installed in existing MK-46 Mod 1 torpedoes to convert them to Mod 5 torpedoes.

MK-15 (PHALANX) Close-in
Weapons System

Provides for the backfit of the PHALANX fast-reaction, last-ditch, air defense system in active fleet ships.

Close-In Weapon System Modifications

Procures modifications to the PHALANX close-in weapon system to improve its capabilities.

Spares and Repair Parts

Procures spares and repair parts for weapons systems.

SSN-688 Class Submarine (Nuclear)

Continued procurement of LOS ANGELES class, high-speed, nuclear-powered attack submarines.

New Design SSN Advanced Procurement

Procures the long-lead items necessary for the new design nuclear submarines.

Battleship Reactivation

Advanced procurement for returning the remaining IOWA class battleship (WISCONSIN) to the fleet with augmented strike capability and at a minimal cost relative to the procurement of new construction combatants.

CV Service Life Extension Program
(SLEP)

The aircraft carrier service life extension program (SLEP) will extend the life of FORRESTAL class aircraft carriers from 30 years to 45 years. Includes propulsion, auxiliary equipment, and electronics.

CG-47 AEGIS Cruiser

Continued procurement of a new class of guided-missile cruiser, armed with AEGIS and other advanced AAW/ASW/SUW systems, to operate with Main Battle Groups and Amphibious Task Groups. The CG will be a broadly capable, heavily armed, and survivable cruiser for the Navy.

DDG-51

Advanced procurement for long-lead-time equipment for a guided missile destroyer, designed to operate offensively in units of Carrier Battle Groups and Surface Action Groups, and in support of Underway Replenishment Groups and Amphibious Assault Groups in multithreat environments including air, surface, and subsurface.

LHD-1 Amphibious Assault Ship

Continued procurement of an amphibious assault ship designed to embark, deploy, and land elements of a marine landing force in an assault by helicopters, V/STOL aircraft, landing craft, and amphibious vehicles.

LPD-4 SLEP

Procurement of long-lead materials for service life extension program (SLEP) which will accomplish survivability ship alterations and engineering equipment modernization.

MCM Mine Countermeasures Ships

Continued procurement of mine countermeasures ships designed to conduct mine clearance operations in maintenance of sea lines of communications, in defense of ports and harbors, and in support of fleet operations.

MSH-1 Coastal Mine Hunter

Procurement for a new class of coastal mine hunting ships capable of mine reconnaissance, classification, and neutralization of moored and bottom mines in US harbors and coastal environments.

TAO Fleet Oiler

Continued procurement of fleet oilers, designed to operate as units of Underway Replenishment Groups, in order to furnish petroleum products to operating forces at sea.

TAGOS SURTASS Ship

Procurement of TAGOS ocean surveillance ships which will be used to support the towed arrays and other equipment of the SURTASS system as a unit of the Military Sealift Command.

AOE Fast Combat Support Ship

Procurement of a combat support ship which will receive fuel, ammunition, and provisions from shuttle ships for rapid distribution to battle groups.

Service Craft

Continued procurement of cargo barges, training craft, and harbor tug boats.

Strategic Sealift

Provide point-to-point cargo (dry/liquid) lift to meet Rapid Strategic Sealift requirements.

LCAC Landing Craft

Continued procurement of air-cushion landing craft.

Outfitting

Government furnished repair parts and other materiel, including stock fund items and general use consumables, required to fill ships' initial allowance of storeroom and operating spare items.

Post Delivery

Program provides funds for the design, planning, government furnished material, and related labor costs required to

correct ship deficiencies defined during acceptance and shakedown trials.

TACS Crane Ship (Conventional)

Conversion of selected container ships of the Ready Reserve Force through the installation of cranes, supplementary crew accommodations, and enhanced break-bulk cargo stowage.

Strategic Platform Support Equipment

Provides funds for the construction of dedicated shore support facilities to provide a full range of industrial support of TRIDENT submarines at Bangor, Washington, and Kings Bay, Georgia.

Sealift Support Equipment

Procurement and positioning of special equipment for merchant ships to provide them with the capability to perform naval auxiliary roles.

Reactor Power Units

Procurement of assemblies of nuclear fuel and associated structural and reactivity control equipment required for the periodic refueling of nuclear-powered ships.

Reactor Components

Includes the components, equipment, and materiel required to provide minimum support needed for the continued safe and reliable operation of Navy nuclear propulsion plants. Funds are programmed for acquisition of replacement components for ship alterations, replacement of stock spare components, and acquisition of equipment necessary for refueling nuclear-powered ships.

AN/SPS-48 (Radar)

Procurement of a three-coordinate, air-search radar whose primary function is to provide target position data to a weapon system in order to meet the challenge of high-speed

attack capabilities of low-fliers, antiship missiles, and modern aircraft.

AN/SQS-53B

Continued procurement of shipboard sonar able to integrate with Tactical Towed Array Sonar (TACTAS), Light Airborne Multipurpose System (LAMPS MK III) and ASW Control System (ASWCS) on CG-26 and DD-93, CG-47 and CGN-38 class ships.

AN/BQQ-5 (Ships Sonar)

Continued procurement of submarine sonar system upgrade kits and associated production and engineering support, providing major capability improvements over the existing sonar system.

Submarine Advanced Combat System

Provides combat system control for the SSN-688 class submarine, which will incorporate enhancements to automate acoustic detection, classification tracking and facilitate third party targeting, weapons setting and launch.

SOSUS

Limited access program.

AN/SQR-19 Towed Array Sonar (TACTAS)

Continued procurement of AN/SQR-19 TACTAS system designed to be the primary passive antisubmarine warfare sensor for surface combatants.

AN/SLQ-32 (Electronic Warfare Equipment)

Procurement of a family of modular, ship-borne electronic warfare equipment to be installed in most combatants and auxiliaries in the surface Navy.

Offboard Deception Devices

Limited access program.

C³ Countermeasures

Limited access program.

Naval Tactical Data System

Continued procurement of the Naval Tactical Data System providing a general purpose combat direction system in major warships. The system permits rapid integration of ship sensor information, analysis of operational data, and initiation of instantaneous ship or fleet reaction in accordance with fleet doctrine stored in computer memories.

Strategic Platform Support Equipment
(Other Ship Electronic Equipment)

Procurement of electronic equipment for the TRIDENT training facility and the TRIDENT briefing facility.

AN/SSQ-53 DIFAR (Sonobuoy)

Continued procurement of a passive, directional sonobuoy used during the localization phase of the air ASW mission; provides accurate target localization information.

AN/SSQ-77 VLAD (Sonobuoy)

Continued procurement of a passive, directional sonobuoy that provides a 7 to 10 decible improvement over the current AN/SSQ-53A system.

SKIPPER

Procurement of a rocket-based, modified MK-83 laser-guided bomb for use as an anti-ship weapon capable of low altitude launch

General Purpose Bombs

Provides funds for continued procurement of general purpose bombs to support Navy mission requirements.

Weapons Range Support Equipment

Provides funds to implement the Navy Fleet Training Range (FTR) instrumentation five year program plan involving EW training systems replacement and modernization, tactical aircrew combat training systems, range computer systems, underwater training range instrumentation, and range tracking surveillance and data links.

5/54 Ammunition Components

Provides for continued procurement of ship gun ammunition (20mm thru 8-inch). Includes ammunition required for fleet training, gun calibration tests, new production trials, and reserves.

5-Inch Guided Projectile

Procurement for a guided projectile which will provide precisely accurate naval gunfire against targets ashore and at sea.

TERRIE^x, TARTAR AEGIS and
TOMAHAWK Support Equipment

Procurement funds for ship missile systems support equipment.

Strategic Platform Support Equipment

Provides for procurement of various ordnance support and training equipment for the Navy's strategic missile arsenal.

QUICKSTRIKE (Mines)

Provides for procurement of the 2000 lb MK-65 case and service and non-service mines including the MK-57 Target Detecting Devices and associated safety and arming devices.

Trucks

Includes various categories of general and special purpose trucks with commercial and tactical design.

Amphibious Equipment

Procurement of various watercraft for transferring cargo from in-stream ships to shore.

Fleet Hospitals

Provides for continued procurement of Fleet Hospital Support Equipment to provide medical support for Navy and Marine Corps personnel during Jcint Rapid Deployment Task Force wartime operations.

Special Purpose Supply Systems

Procurement of Initial System Stock (ISS) and Initial Outfitting (IO) of training simulators.

Intelligence Support Equipment

Procurement funds for equipment needed for the Naval Intelligence Command and its field activities. It is part of the general defense intelligence program requirements. Further information on this program is classified.

Computer Acquisition Program

Procurement of general-purpose automatic data processing equipment, Navy-wide.

Ammunition

Continued procurement of mortar and 155mm ammunition.

M198 Howitzer, Medium, Towed, 155mm

Marine Corps procurement of lightweight, rugged, towed 155mm field artillery howitzer, constructed of aluminum and steel and air transportable by CH-53E helicopter or C-130.

HAWK

Continued procurement program to equip three HAWK battalions with four TRIAD batteries each.

STINGER Missile System

Continued procurement of STINGER missiles as a replacement for the obsolete REDEYE missile. The STINGER has greater accuracy and significantly improved engagement/attack capabilities.

Unit Level Circuit Switch (ULCS)

Procurement of digital switching equipment that provides an automatic secure telephone switching capability to the field.

Position Locating Reporting System
(PLRS) AN/TSQ-129

Continued procurement of a lightweight, portable tactical command and control system which automatically provides accurate, real-time position location information relative to friendly combat elements to the tactical commander, allowing better maneuver control, deployment optimization, and more effective fire and air support coordination.

Marine Integrated Fire and Air
Support System

Procurement funds for command and control equipment.

AM/TYQ-23 Tactical Air Operation
Center

Procurement funds for command and control equipment.

High Mobility Multi-Wheeled Vehicles
(HMMWV)

Continued procurement of high-mobility, multipurpose wheeled vehicles (HMMWV) configured to meet multimission roles, to

include: command and control, TOW weapons platform, communications, and personnel carrier.

Logistics Vehicle System

Provides for the procurement of replacements for over-age, over-mileage vehicles.

Spares and Repair Parts

Procurement of spares and repair parts for Marine Corps vehicles.

AIR FORCE (RDT&E)Defense Research Sciences

PE 61102F

The funding base for a continuing program to obtain scientific knowledge required to provide alternatives for future development, prevent technological surprise, and assist in the solution of technical problems, thereby enhancing Air Force mission area operational capabilities. Program maintains in-house scientific expertise for immediate availability when needed by the Air Force.

Materials

PE 62102F

Program develops new and improved materials which are required to meet the increased performance, reliability, and survivability demands of all current and future Air Force aerospace systems.

Aerospace Flight Dynamics

PE 62201F

Provides the flight vehicle technologies required for the design and development of future aircraft, missile and spacecraft, and for the improvement of current vehicles. The program also provides for the operational support and management of the Air Force Flight Dynamics Laboratory (AFFDL) located at Wright-Patterson AFB, OH.

Aerospace Biotechnology

PE 62202F

Program funds the operational support and management for the research and development activities performed by the Aerospace Medical Division, Brooks AFB, Texas. This includes the Air Force Aerospace Medical Research Laboratory, Wright-Patterson AFB, Ohio, and the USAF School of Aerospace Medicine, Brooks AFB, Texas.

Aerospace Propulsion

PE 62203F

Program develops propulsion and power technology in support of current and future aerospace vehicles and weapon systems.

Conventional Munitions

PE 62602F

This program maintains and advances the Air Force technology base to support development of air-delivered conventional and chemical weapons.

Command/Control/Communications

PE 62702F

This program element provides a broad technology base for advancing Air Force mission capabilities in command, control, and communications. Six basic technology areas are pursued: surveillance; intelligence; communications and control; information sciences; electronic reliability and electromagnetic compatibility; and electromagnetic radiation, devices and components. The program element also provides for the operation and management of the Rome Air Development Center (RADC), Griffiss AFB, NY, and the RADC Deputy for Electronic Technology, Hanscom AFB, MA.

Very High-Speed Integrated
Circuits

PE 63452F

A tri-Service program to develop two generations of integrated circuits with very high data processing capacity for a wide range of military systems. Initial applications will be in digital signal processors for radar, antisubmarine warfare, communications, missile guidance, electronic warfare, and optical sensor systems.

Nuclear Systems Advanced
Development

PE 63453F

A program which provides the forum for developing and evaluating advanced concepts in nuclear weapons and nuclear weapons systems.

Advanced Radiation Technology

PE 63605F

The Air Force technology program to establish the technical feasibility of high-energy laser weapons for Air Force tactical and other broad-based, generic applications.

Advanced Concepts

PE 63312F

Limited access program.

Strategic Conventional Standoff
Capability (SCSC)

PE 64326F

Program provides funding for validation demonstration of HAVE DARK technology for present and future strategic bombers.

Advanced Cruise Missile

PE 11120F

Limited access program.

NCMC-TW/AA Systems

PE 12310F

Program funds the replacement of tactical warning/attack assessment (TW/AA) command, control, and communications systems located in the North American Aerospace Defense Command (NORAD) Cheyenne Mountain Complex (NCMC).

CONUS Over-the-Horizon Radar

PE 12417F

Program develops an over-the-horizon backscatter radar to satisfy requirements for tactical early warning of an attack on North America by bombers and air-to-surface missiles.

Defense Support Program

PE 12431F

Classified program.

Minimum Essential Emergency
Communications Network

PE 33131F

Air Force portion of a continuing program supporting the Chairman, Joint Chiefs of Staff, who is responsible for delivery of decisions of the National Command Authority in a precise and timely manner.

WWMCCS

Program supports necessary facilities and the related costs for resources directly associated with planning, designing, developing and implementing automated data processing systems for the World Wide Military Command and Control System (WWMCCS) Information System (WIS).

MILSTAR Satellite Communication PE 33601F
System (Air Force terminals)

Consolidates the development of the ground and aircraft satellite communications terminals needed for operation with the AFSATCOM and MILSTAR satellite systems to satisfy critical needs of the National Command Authority and military commanders-in-chief for reliable, worldwide communications for command and control of strategic nuclear forces and other high priority users.

MILSTAR Communications Satellite PE 33603F
System

The MILSTAR Satellite Communications System will provide worldwide satellite communications for command and control of tactical and strategic forces of all services.

BERNIE PE 35172F

Limited access program.

Special Analysis Activities PE 35892F

Limited access program.

Advanced Tactical Fighter PE 63230F

Program will develop technologies and concepts and define required characteristics for the next-generation tactical fighter aircraft.

Advanced Tactical Air
Reconnaissance System

PE 63239F

Program will develop technologies and concepts and define required characteristics for the next-generation air reconnaissance aircraft.

Special Programs

PE 63801F

Limited access program.

Engine Model Derivative Program

PE 64218F

An engineering development program to provide existing air vehicle systems with the latest advances in engine technology and to provide a framework for engine development for future systems.

Nuclear Weapons Support

PE 64222F

Provides funds for continuing support of activities that develop hardware associated with nuclear weapons (other than warheads) and activities that provide for safe and effective nuclear weapons delivery.

Alternate Fighter Engine

PE 64223F

Supports the competitive acquisition of durable, supportable and affordable fighter engines to support the expanding F15 and F16 fighter fleets. Provides full scale development funds for higher performance F100 and F110 engines in support of the tactical fighter improvement program.

C-17 Intertheater Aircraft

PE 64231F

Program to develop a new cargo aircraft to provide the additional airlift capability needed for rapid intertheater deployment of combat forces to support national objectives and for timely intratheater movement to meet forward area mobility requirements.

Aircraft Engine Component
Improvement Program

PE 64263F

Provides funds for the continuation of aircraft engine component improvement programs. These programs are designed to enhance readiness through improvements in durability, maintainability, operability, reliability, repairability, and suitability of the engine as operational conditions change and service time is accumulated.

T-46A

PE 64313F

Provides funds for the development of the T-46A primary flight trainer to replace the operationally deficient T-37. The aircraft is a side-by-side, twin-turbofan-engine, pressurized aircraft using off-the-shelf equipment when possible.

Advanced Medium-Range Air-to-Air
Missile

PE 64314F

Provides funds to continue engineering design, development and fabrication of the Advanced Medium-Range Air-to-Air Missile. This is a joint Air Force/Navy program to develop an AIM-7 SPARROW follow-on air superiority air-to-air missile, compatible with the F-14, F-15, F-16, F/A-18, and appropriate NATO aircraft.

Surface Defense Suppression

PE 64733F

The GBU-15 is a modular guided weapon system designed to destroy high-value, point targets and enemy defense sites.

Protective Systems

PE 64738F

Program provides funds for the engineering development of countermeasures equipment for the B-52 and the F/FB-111 aircraft and for other related electronic warfare equipment.

Tactical Protective Systems

PE 64739F

Program provides for the engineering development of new and improved self-protection electronic warfare (EW) equipment for tactical strike, air superiority, airlift, and reconnaissance aircraft.

Precision Location Strike
System (PLSS)

PE 64742F

Program is designed to develop and test a highly accurate emitter location system providing day/night, adverse weather, intelligence and suppression of enemy air defense capabilities.

Joint Tactical Information
Distribution System (JTIDS)

PE 64754F

Provides funds to develop a highly jam-resistant, secure digital information distribution system for use in a tactical combat environment. The system will provide sufficient connectivity and capacity to permit rapid and secure exchange of necessary command, control, and status information among all equipped elements in the tactical theater.

Joint Surveillance and Target
Attack Radar System (Joint STARS)

PE 64770F

Closed-loop system for the real-time detection, tracking, and attack of second echelon ground movers. Program designed to integrate an accurate attack against second echelon enemy forces by providing guidance updates to standoff missiles and by cue-vectoring attack aircraft against the enemy targets.

Tactical Fighter Squadrons

F-111
F-15
F-16

PE 27129F
PE 27130F
PE 27133F

Programs provide for engineering design and development of systems update as required. Continuing programs include flight tests, management engineering support, and systems integration. Effort includes development of F-15E (Dual Role Fighter) which retains basic F-15 air-to-air capabilities while adding systems to meet an urgent requirement for all weather deep penetration and night adverse weather air-to-surface attack. Pre-full scale development effort will also continue on an F-16 derivative.

Airborne Warning and Control
Systems (E-3A)

PE 27417F

Program consists of system improvements to enable the US to maintain the E-3A as an effective, survivable, airborne surveillance system for command and control of tactical forces and the strategic defense of North America. Includes the manpower authorization, peculiar and support equipment, necessary facilities, and the associated costs specifically identified and attributable to the Airborne Warning and Control System (AWACS).

Advanced Communication System

PE 27423F

Provides RDT&E funds for development, modification engineering, and continued integration engineering of HAVE QUICK, Enhanced JTIDS Systems, and SINGARS-V jam-resistant, advanced communications systems.

Special Activities

PE 34111F

Limited access program.

Traffic Control/Approach/
Landing System (TRACALS)

PE 35114F

Program provides the Air Force with the air traffic control and landing equipment required for safe, efficient, worldwide, all-weather Air Force flying operations.

Space Test Program (STP)

PE 63402F

The Space Test Program advances DoD technology by providing spaceflight missions for experiments that demonstrate new space system technologies, concepts, and designs, and that determine space environmental effects on DoD space systems. This tri-Service program provides the only substantial spaceflight capability to perform fly-before-buy demonstrations of advanced technology designs. The STP is to be the pathfinder for exploiting the Shuttle as a manned DoD space laboratory which should expedite the infusion of new technology into space systems through the use of simpler, incrementally-designed, man-aided experiments.

Flight Simulator Development

PE 64227F

A continuing program for the engineering development of aircrew flight simulator techniques and training devices.

Space Shuttle

PE 64411F

Program has as its main objectives: (1) supporting NASA development and assuring the utility to DoD of the Space Transportation System; (2) transitioning critical national defense satellites to the space shuttle; and (3) acquiring and operating general purpose space shuttle launch and landing facilities at Vandenberg AFB, California.

Range Improvement

PE 64735F

Program develops instrumentation and threat simulator systems to increase the effectiveness of development and operational testing, training, and large-scale exercises worldwide.

Improved Capability for RDT&E

PE 64755F

Program provides for the engineering, development, acquisition, and installation of significant new test range and instrumentation systems required for development, test, and evaluation.

Acquisition and Command Support

PE 65806F

Program provides the resources to support the various staff functions, the technical mission, and support activities at each of the six Air Force Systems Command divisions.

Test and Evaluation Support

PE 65807F

Program provides resources for operating Air Force Systems Command test activities which are part of the DoD major range and test facility base.

RDT&E Aircraft Support

PE 65863F

Program provides resources for maintaining all Air Force Systems Command assigned test and test-support coded aircraft which are included as a portion of the DoD major range and test facility base.

Satellite Control Facility

PE 35110F

Provides funding support for the maintenance of a highly reliable national satellite tracking, telemetry, and commanding capability to support the development and operation of DoD satellite systems. The Air Force Satellite Control Facility consists of a global network which includes instrumentation systems, antennae, communications and data processing equipment required to support a growing inventory of increasingly complex space vehicles.

Space Boosters

PE 35119F

Provides for the procurement, engineering support, and flight performance assessment of DoD expendable launch vehicles.

Consolidated Space Operations Center (CSOC)

PE 35130F

The Consolidated Space Operations Center consists of two elements: the Satellite Operations Complex (SOC) and the Shuttle Operations and Planning Complex (SOPC). CSOC provides: a secure environment from which to conduct DoD space missions; siting to minimize environmental and man-made threats; adequate capacity to support the national Shuttle traffic model; and the capability to conduct military space operations from dedicated DoD facilities allowing close coordination of Shuttle and satellite operations.

Defense Meteorological Satellite Program

PE 35160F

Provides the satellites and sensors, ground command and control, Air Force mobile tactical ground terminals, operations and maintenance, and booster modifications to support the Defense Meteorological Satellite Program.

Space Launch Support

PE 35171F

Program provides the Space Transportation System resources needed to transport Air Force space payloads into their mission orbits. Requirements include such capabilities as communications, navigation and weather reporting.

Industrial Preparedness

PE 78011F

A continuing program to improve efficiency and productivity in the peacetime defense industrial base; improve responsiveness and our ability to surge, mobilize, and sustain wartime production; and increase efforts in industrial base planning.

T-46A New Generation Trainer

Provides for the procurement of a replacement for the operationally deficient T-37 trainer aircraft for all AF training programs including UPT, UNT, and accelerated copilot enrichment programs for SAC.

TR-1/U-2R

Provides for the procurement of a tactical variant of the highly reliable and versatile U-2R aircraft currently in the strategic reconnaissance inventory. The tactical reconnaissance TR-1, equipped with the latest sensors, will provide a battlefield surveillance system available to the theater/tactical commander into the 1990s.

Modification of In-Service Aircraft

Program is designed to maintain the Air Force aircraft inventory at the most modern configuration level at the minimum cost. Modifications are necessary to enable tactical and support forces to maintain superiority over hostile forces, to extend the active service life of aircraft, and to keep abreast of changing mission requirements. Program also initiates procurement of the NAVSTAR Global Positioning System terminals for a variety of aircraft.

Spares and Repair Parts (Aircraft)

Provides for the procurement of initial and replenishment spares and repair parts for aircraft, peculiar support equipment, training equipment, replacement equipment, and modification programs.

Advanced Cruise Missile

Limited access program.

AIM-7F/M SPARROW

Provides for the procurement of rocket-propelled, high-reliability, air-to-air missile equipped with all-weather, 360° attack capability with look-down, shoot-down capability.

AIR FORCE (PROCUREMENT)F-15 C/D/E

Provides for the procurement of F-15 aircraft, a twin-engine, swept-wing aircraft designed for high maneuverability in air-to-air combat and low altitude penetration missions.

F-16 C/D

Provides for the procurement of F-16 multipurpose single-seat, fixed-wing, high-performance fighter aircraft capable of performing a broad spectrum of tactical air warfare tasks.

KC-10A Advanced Tanker/Cargo Aircraft

Provides for the procurement of production-line McDonnell-Douglas DC-10 aircraft modified only as necessary to provide an air refueling capability and to fully exploit the aircraft's cargo carrying potential.

MC-130H

Provides for the procurement of a medium-size transport aircraft to satisfy shortfalls in the size and capability of airlift support for special operations forces.

C-5B

Provides for continued procurement of C-5 aircraft, a service-proven, wide-bodied, intertheater airlift aircraft that can carry the full spectrum of military air cargo.

C-17

Provides for the advanced procurement of the C-17, a multi-engine, turbofan, wide-body aircraft capable of airlifting a substantial payload over intercontinental ranges without refueling and operating within an austere airfield/moderate threat environment.

AIM-9L/M SIDEWINDER

Provides for the procurement of a short-range air-to-air missile designed to retain all demonstrated guidance performance characteristics of the AIM-9L while significantly reducing operational limitations when used against infrared countermeasures and clutter background.

AGM-130 (Powered GBU-15)

Provides for product improvement to the GBU-15 to expand the payload capability and to increase the standoff range while preserving its high terminal accuracy.

AGM-65D MAVERICK

Provides for the procurement of imaging infrared MAVERICK air-to-ground missiles designed to destroy small, hard targets during day/night or adverse weather.

AGM-88A HARM

Provides for the procurement of the HARM air-to-surface, anti-radiation missile designed to destroy and suppress radar-directed air defense systems.

AMRAAM

Provides for the procurement of the Advanced Medium Range Air-to-Air Missile (AMRAAM). AMRAAM will provide an all-weather, all-aspect, beyond-visual-range, air-to-air attack capability.

Class IV Modifications

Program will provide for the continued procurement of modifications to improve reliability, maintainability, and extend service life of the AIM-9 SIDEWINDER and the LGM-30 MINUTEMAN. Major efforts include the continuation of efforts begun in FY 1983 to insure the logistic support of the MINUTEMAN II guidance unit and MINUTEMAN Launch Facility and Launch Control Facility security systems.

Spares and Repair Parts (Missiles)

Provides for the procurement of initial and replenishment spares and repair parts for: ballistic missiles, other missiles, target drones, peculiar support equipment, training equipment, replacement equipment, and modification programs.

Global Positioning System

Provides for procurement of Universal Navigation Satellites.

Space Launch Support

Provides for the procurement of Inertial Upper Stages, Payload Assist Modules-Delta Class II, and Centaur G upper stages. Also provides spares at Vandenberg AFB to support space shuttle processing and operational space programs (excluding Support Missions) launching on the Space Shuttle.

Defense Meteorological Satellite
Program (DMSP)

A joint Service program which provides DoD's most important single source of weather data. DMSP is an advanced weather satellite system which supports both strategic and tactical missions by providing worldwide, high-resolution visual and infrared cloud imagery and other specialized meteorological data.

Defense Satellite Communications
System (DSCS)

Provides for the procurement of DSCS III satellites and associated launch vehicle support. DSCS provides super high frequency satellite communications for secure voice and high-data-rate transmissions, and it satisfies unique and vital national security communications requirements for worldwide military command and control, crisis management, relay of intelligence, early warning data, treaty monitoring and surveillance information, and diplomatic traffic.

Space Shuttle

Program funds procurement of equipment for the space shuttle launch facilities at Vandenberg AFB and resources for ensuring that NASA facilities meet DoD security requirements.

IONDS

Provides for the procurement of integrated orbital nuclear detection system equipment and sensors.

Special Programs

Limited access program.

Special Update Programs

Limited access program.

Munitions and Associated Equipment

Provides for continued procurement of munitions and other similar items.

Secure Data

Program provides for the procurement and installation of devices for the encryption and decryption of communications to insure the security of voice, teletype, and data communications.

Tactical Air Control SystemImprovements

Provides upgrades and improvements to equipment used in the Tactical Air Control System.

Defense Support Program (DSP)

Classified Program.

CONUS OTH-B Radar

Provides for procurement of Over-the-Horizon Backscatter Radar designed to provide tactical early warning of hostile aircraft in the approaches to North America. This will allow detection of penetrating bombers beyond the range of their stand-off missiles and provide increased warning time.

PAVE PAWS

Program provides for the procurement of electronic equipment to augment existing systems and to replace obsolete equipment in support of the Submarine-Launched Ballistic Missile Detection (PAVE PAWS) system.

Consolidated Space Operations Center

Provides for the procurement of equipment for the shuttle operations and planning center, satellite operations center, and facility communications, designed to provide tracking, telemetry, and commanding services to orbiting satellite systems and a control center for military space shuttle flights.

Joint Tactical Communications Program
(TRI-TAC)

Program funds a joint service effort to develop and acquire tactical communications equipment, which can be used in combat.

MILSTAR

MILSTAR is a joint service program of communications satellites to provide improved, survivable, jam-resistant communications to both strategic and tactical users.

Wide-Band Systems Upgrade

Provides funds for the worldwide terrestrial upgrade of the Air Force portion of the Defense Communications System (DCS). Individual projects within this program digitize the government-owned transmission systems in a systematic manner so as to coincide with the plans and actions affecting the

composite of DoD-owned and leased networks comprising the DCS. Program was undertaken to capitalize on advantages afforded by new technology, namely bulk encryption for security, capacity, and potential reductions in operations and maintenance of the system.

Minimum Essential Emergency
Communications Network

Provide initial procurement of the MEECN equipment.

Communications-Electronics Class IV
Modifications

Provides for continued procurement of modifications to in-service systems and equipment.

Chemical/Biological Defense Program

Procurement of chemical/biological defense equipment required to detect, warn, and protect personnel and decontaminate personnel and equipment from chemical/biological agents. These systems will allow the Air Force to continue operating in a chemical/biological environment.

Mobility Equipment

Provides for the acquisition of equipment for prepositioning in overseas areas to reduce the requirement for airlift in an emergency.

Selected Activities

Limited access program.

Special Update Program

Limited access program.

DEFENSE AGENCIES (RDT&E)Defense Research Sciences

PE 61101E

A DARPA program to explore new materials, processing techniques, and structures. Program is designed to devise concepts and demonstrate innovative solutions for overcoming materials-related limitations or barriers to advancement in the capability of: advanced bearings and lubricants, thermochromic and ultraviolet laser materials, new material technology concepts, rapid-solidification technology, improved propulsion engine materials, metal-matrix components, carbons, ceramics derived from polymers, dynamic synthesis and compaction of unusual materials, and laser countermeasure materials.

Strategic Technology

PE 62301E

Program funds a comprehensive research and development program directed toward the development and application of advanced technologies associated with advanced strategic system concepts; strategic communications and signal processing; submarine laser communications; strategic computing; intelligent systems; electro-optics; advanced radar techniques; and hypersonic flight systems.

Tactical Technology

PE 62702E

A DARPA program dedicated to the development of advanced tactical technologies and concepts that will serve as the basis for development of the next generation of tactical systems. Program goal is to advance non-nuclear, tactical, combat capabilities with careful consideration to realistic costs and service manpower constraints.

Integrated Command/Control Technology

PE 62708E

A DARPA program to develop research in integrated command and control technology. The program develops advanced information processing, computer communications, and systems sciences technology, which can provide the technology base for future command and control systems, and to demonstrate and evaluate them with the Services in selected operational environments.

Nuclear Monitoring

PE 62714E

Program conducts research and development to provide new technological options for enhancing US capabilities for monitoring nuclear explosion events. The program also provides technical information needed for developing national policy for negotiations on treaties limiting nuclear testing and provides technical support for US participation in treaty-related international activities.

Defense Nuclear Agency

PE 62715H

The combined DoD program for research and development of effects of nuclear weapons, the DoD portion of the joint DoE/DoD nuclear weapons testing programs, and the survivability and security of nuclear weapons. This program element represents projects developed through joint efforts of the Military Services and DNA and provides for: research and development of nuclear weapons effects information for the DOD; execution of underground nuclear weapons effects test events, non-nuclear simulation of nuclear weapons effects test events, and operation of nuclear weapon effects simulation facilities; evaluation of the survivability and security of theater nuclear forces and weapons to include identification of alternative technological solutions for present and expected problems including the various elements of theater systems such as nuclear delivery units, weapons control and support, and the full spectrum of possible hostile threats; all DoD exploratory development projects for physical security to include the establishment and operation of the DoD Physical Security Operational Test Site.

Experimental Evaluation of
Major Innovative Technology

PE 63226E

Program funds-TEAL RUBY experiment, helicopter technology demonstrations, X-29 advanced technology demonstrator, long-range aircraft interceptor experiment, advanced undersea vehicle, and advanced cruise missile technology.

C³ Interoperability

PE 28045D

Limited Access Program.

Cryptologic Activities

PE 31011G

Limited Access Program.

Communications Security

PE 33401G

Limited Access Program.

DMA Exploitation Program

PE 35139B

The DMA Exploitation Program effort will provide the Defense Mapping Agency (DMA) with an all-digital production capability. This will facilitate the modernization of DMA's production processes to meet current and future requirements to support state-of-the-art and new weapons systems with products from digital source materials.

Defense Reconnaissance Support
Activities

PE 35159B/I

Limited Access Program.

Tactical Cryptological Activities

PE 35985G

Limited Access Program.

Test and Evaluation

PE 65804D

Program supports responsibilities of the Director Defense Test and Evaluation (DDTE) for joint testing of developmental and deployed systems to determine capabilities to perform intended missions in joint environments, for independent activities in the direction and supervision of test and evaluation, and for study efforts to improve the effectiveness and efficiency of the 19 DOD major Ranges and Test Facilities.

DEFENSE AGENCIES (PROCUREMENT)Classified Equipment, NSA

Limited Access Program.

Mechanized Materials Handling System

Provides funds for major equipment used by the Defense Logistics Agency.

ADP Equipment

Provides funds for ADP equipment used by the Defense Logistics Agency.

Items Less Than \$900,000 Each
(Major Equipment, DRSP)

Limited Access Program.

DEPARTMENT OF ENERGY PROGRAMS

Activities related to these programs predominantly provide for normal maintenance and reliability assessment of the nuclear stockpile. None of these programs are judged to have a significant impact on arms control policy or negotiations.

W71 -- A nuclear warhead developed for the SPARTAN, a surface-to-air ABM missile.

W70, Mods 1, 2, and 3 -- A nuclear warhead developed for the LANCE missile, a mobile, surface-to-surface ballistic missile system.

W69 -- A nuclear warhead deployed in the AGM-69A Short-Range Attack Missile (SRAM) which was developed as a defense-suppression and stand-off missile for carriage on the B-52 and FB-111 and will be compatible with the B1-B.

W68 -- The nuclear warhead for the MK-3 re-entry body which is carried on the POSEIDON Fleet Ballistic Missile. Each missile has the capability of independently targeting multiple warheads.

W66 -- A nuclear warhead developed for the SPRINT missile, the endoatmospheric component of the ABM system.

W62 -- A nuclear warhead deployed in a current MK-12 re-entry vehicle on the MINUTEMAN III missile. This system provides a multiple independently targetable re-entry vehicle (MIRV) capability.

B61, Mods 0, 1, 2, 3, 4, 5, 6, 7, 8 -- A lightweight, multipurpose, multi-yield, aircraft-delivered, nuclear gravity bomb.

B57 -- A lightweight, multipurpose, multiyield, nuclear depth charge or nuclear bomb.

W56-4 -- A nuclear warhead for the MK-11 re-entry vehicle carried on the MINUTEMAN II ballistic missile.

W55 -- A nuclear warhead used with the Submarine Rocket (SUBROC), a rocket-propelled, anti-submarine nuclear depth bomb.

B54 -- A nuclear warhead used in the Special Atomic Demolition Munition (SADM).

W53 -- A nuclear warhead used as the payload in the MK-6 re-entry vehicle for the TITAN II ICBM.

B53 -- A high-yield nuclear gravity bomb designed to be delivered from a B-52 aircraft.

W50 -- A nuclear warhead used in MGM-31A and MGM-31B (PERSHING) field artillery missiles.

W48 -- A nuclear warhead for the 155mm artillery-fired atomic projectile (AFAP).

W45-1 -- A warhead which provides a nuclear capability for the Navy's TERRIER surface-to-air guided missile, designed as anti-aircraft armament for selected surface ships.

W44 -- A nuclear warhead used with the Anti-Submarine Rocket (ASROC) missile deployed on selected surface combatant ships.

B43 -- A nuclear gravity bomb that can be delivered by most of the nuclear-capable strategic and tactical aircraft in the US inventory.

W33 -- A nuclear warhead for the Army 8-inch Artillery-Fired Atomic Projectile (AFAP).

W31 -- A nuclear warhead for both the HONEST JOHN free-flight surface-to-surface missile and the NIKE HERCULES surface-to-air guided missile.

B28 -- A nuclear gravity bomb that can be delivered by a variety of aircraft in the US inventory.

APPENDIX A
TREATY ANNEX

(U) This appendix contains excerpts from relevant arms control agreements referred to in the analyses in Section III. These excerpts are included as quick reference material. Full texts and negotiating histories can be found in Arms Control and Disarmament Agreements published by the U.S. Arms Control and Disarmament Agency and available through the US Government Printing Office.

Biological Weapons Treaty

CONVENTION ON THE PROHIBITION OF THE DEVELOPMENT, PRODUCTION
AND STOCKPILING OF BACTERIOLOGICAL (BIOLOGICAL) AND TOXIN
WEAPONS AND ON THEIR DESTRUCTION

April 10, 1972

Article I

Each State Party to this Convention undertakes never in any circumstances to develop, produce, stockpile or otherwise acquire or retain: 1) Microbial or other biological agents, or toxins whatever their origin or method of production, of types and in quantities that have no justification for prophylactic, protective or other peaceful purposes; 2) Weapons, equipment or means of delivery designed to use such agents or toxins for hostile purposes or in armed conflict.

Article II

Each State Party to this Convention undertakes to destroy, or to divert to peaceful purposes, as soon as possible but not later than nine months after the entry into force of the Convention, all agents, toxins, weapons, equipment and means of delivery specified in article I of the Convention, which are in its possession or under its jurisdiction or control. In implementing the provisions of this article all necessary safety precautions shall be observed to protect populations and the environment.

Article III

Each State Party to this Convention undertakes not to transfer to any recipient whatsoever, directly or indirectly, and not in any way to assist, encourage, or induce any State, group of States or international organizations to manufacture or otherwise acquire any of the agents, toxins, weapons, equipment or means of delivery specified in article I of the Convention.

SALT I Interim AgreementINTERIM AGREEMENT BETWEEN THE UNITED STATES OF AMERICA
AND THE UNION OF SOVIET SOCIALIST REPUBLICS ON CERTAIN
MEASURES WITH RESPECT TO THE LIMITATION OF STRATEGIC
OFFENSIVE ARMS

May 26, 1972

Article I

The Parties undertake not to start construction of additional fixed land-based intercontinental ballistic missile (ICBM) launchers after July 1, 1972.

Article III .

The Parties undertake to limit submarine-launched ballistic missile (SLBM) launchers and modern ballistic missile submarines to the numbers operational and under construction on the date of signature to this Interim Agreement, and in addition to launchers and submarines constructed under procedures established by the Parties as replacements for an equal number of ICBM launchers of older types deployed prior to 1964 or for launchers on older submarines.

Protocol to the Interim Agreement

May 26, 1972

Have agreed as follows:

The Parties understand that, under Article III of the Interim Agreement, for the period during which that Agreement remains in force:

The U.S. may have no more than 710 ballistic missile launchers on submarines (SLBMs) and no more than 44 modern ballistic missile submarines. The Soviet Union may have no more than 950 ballistic missile launchers on submarines and no more than 62 modern ballistic missile submarines.

Additional ballistic missile launchers on submarines up to the above-mentioned levels, in the U.S. over 656 ballistic missile launchers on nuclear-powered submarines, and in the U.S.S.R. over 740 ballistic missile launchers on nuclear-powered submarines, operational or under construction, may become operational as replacements for equal numbers of ballistic missile launchers of older types deployed prior to 1964 or of ballistic missile launchers on older submarines.

The deployment of modern SLBMs on any submarine, regardless of type, will be counted against the total level of SLBMs permitted for the U.S. and the U.S.S.R.

This Protocol shall be considered an integral part of the Interim Agreement.

Agreed Statements, Common Understandings, and Unilateral
Statements Regarding the Interim Agreement

May 26, 1972

Agreed Statements

[C]

The Parties understand that in the process of modernization and replacement the dimensions of land-based ICBM silo launchers will not be significantly increased.

[E]

The Parties understand that dismantling or destruction of ICBM launchers of older types deployed prior to 1964 and ballistic missile launchers on older submarines being replaced by new SLBM launchers on modern submarines will be initiated at the time of the beginning of sea trials of a replacement submarine, and will be completed in the shortest possible agreed period of time. Such dismantling or destruction, and timely notification thereof, will be accomplished under procedures to be agreed in the Standing Consultative Commission.

2. Common Understandings

A. Increase in ICBM Silo Dimensions

Ambassador Smith made the following statement on May 26, 1972:

The Parties agree that the term "significantly increased" means that an increase will not be greater than 10-15 percent of the present dimensions of land-based ICBM silo launchers.

Minister Semenov replied that this statement corresponded to the Soviet understanding.

Threshold Test Ban Treaty (TTBT)TREATY BETWEEN THE UNITED STATES OF AMERICA AND THE UNION OF
SOVIET SOCIALIST REPUBLICS ON THE LIMITATION OF UNDERGROUND
NUCLEAR WEAPON TESTS

July 3, 1974

Article I

1. Each Party undertakes to prohibit, to prevent, and not to carry out any underground nuclear weapon test having a yield exceeding 150 kilotons at any place under its jurisdiction or control, beginning March 31, 1976.
2. Each Party shall limit the number of its underground nuclear weapon tests to a minimum.
3. The Parties shall continue their negotiations with a view toward achieving a solution to the problem of the cessation of all underground nuclear weapon tests.

Article II

1. For the purpose of providing assurance of compliance with the provisions of this Treaty, each Party shall use national technical means of verification at its disposal in a manner consistent with the generally recognized principles of international law.
2. Each Party undertakes not to interfere with the national technical means of verification of the other Party operating in accordance with paragraph 1 of this Article.
3. To promote the objectives and implementation of the provisions of this Treaty the Parties shall, as necessary, consult with each other, make inquiries and furnish information in response to such inquiries.

Peaceful Nuclear Explosions Treaty (PNET)PROTOCOL TO THE TREATY BETWEEN THE UNITED STATES OF AMERICA
AND THE UNION OF SOVIET SOCIALIST REPUBLICS ON THE LIMITATION
OF UNDERGROUND NUCLEAR WEAPON TESTS

May 28, 1976

Article III

2. Each Party undertakes to prohibit, to prevent and not to carry out at any place under its jurisdiction or control, and further undertakes not to carry out, participate or assist in carrying out anywhere:

(a) any individual explosion having a yield exceeding 150 kilotons;

(b) any group explosion:

(1) having an aggregate yield exceeding 150 kilotons except in ways that will permit identification of each individual explosion and determination of the yield of each individual explosion in the group in accordance with the provisions of Article IV of and the Protocol to this Treaty;

(2) having an aggregate yield exceeding one and one-half megatons;

(c) any explosion which does not carry out a peaceful application;

(d) any explosion except in compliance with the provisions of the Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water, the Treaty on the Non-Proliferation of Nuclear Weapons, and other international agreements entered into by that Party.

3. The question of carrying out any individual explosion having a yield exceeding the yield specified in paragraph 2(a) of this article will be considered by the Parties at an appropriate time to be agreed.

Article IV

1. For the purpose of providing assurance of compliance with the provisions of this Treaty, each Party shall:

(a) use national technical means of verification at its disposal in a manner consistent with generally recognized principles of international law; and

(b) provide to the other Party information and access to sites of explosions and furnish assistance in accordance with the provisions set forth in the Protocol to this Treaty.

2. Each Party undertakes not to interfere with the national technical means of verification of the other Party operating in accordance with paragraph 1(a) of this article, or with the implementation of the provisions of paragraph 1(b) of this article.

SALT IITREATY BETWEEN THE UNITED STATES OF AMERICA AND THE UNION
OF SOVIET SOCIALIST REPUBLICS ON THE LIMITATION OF STRATEGIC
OFFENSIVE ARMS*

June 18, 1979

Article II

3. Heavy bombers are considered to be:

(a) Currently, for the United States of America, bombers of the B-52 and B-1 types, and for the Union of Soviet Socialist Republics, bombers of the Tupolev-95 and Myasishchev types;

(b) In the future, types of bombers which can carry out the mission of a heavy bomber in a manner similar or superior to that of bombers listed in subparagraph (a) above;

(c) Types of bombers equipped for cruise missiles capable of a range in excess of 600 kilometers; and

(d) Types of bombers equipped for ASBMs.

Fourth Agreed Statement. Having agreed that every bomber of a type included in paragraph 3 of Article II of the Treaty is to be considered a heavy bomber, the Parties further agree that:

(a) Airplanes which otherwise would be bombers of a heavy bomber type shall not be considered to be bombers of a heavy bomber type if they have functionally related observable differences which indicate that they cannot perform the mission of a heavy bomber;

(b) Airplanes which otherwise would be bombers of a type equipped for cruise missiles capable of a range in excess of 600 kilometers shall not be considered to be bombers of a type equipped for cruise missiles capable of a range in excess of 600 kilometers if they have functionally

* As an aid to the reader, the texts of the Agreed Statements and Common Understandings are beneath the articles of the Treaty and Protocol to which they pertain.

related observable differences which indicate that they cannot perform the mission of a bomber equipped for cruise missiles capable of a range in excess of 600 kilometers, except that heavy bombers of current types, as designated in subparagraph 3(a) of Article II of the Treaty, which otherwise would be of a type equipped for cruise missiles capable of a range in excess of 600 kilometers shall not be considered to be heavy bombers of a type equipped for cruise missiles capable of a range in excess of 600 kilometers if they are distinguishable on the basis of externally observable differences from heavy bombers of a type equipped for cruise missiles capable of a range in excess of 600 kilometers; and

(c) Airplanes which otherwise would be bombers of a type equipped for ASBMs shall not be considered to be bombers of a type equipped for ASBMs if they have functionally related observable differences which indicate that they cannot perform the mission of a bomber equipped for ASBMs, except that heavy bombers of current types, as designated in subparagraph 3(a) of Article II of the Treaty, which otherwise would be of a type equipped for ASBMs shall not be considered to be heavy bombers of a type equipped for ASBMs if they are distinguishable on the basis of externally observable differences from heavy bombers of a type equipped for ASBMs.

First Common Understanding. Functionally related observable differences are differences in the observable features of airplanes which indicate whether or not these airplanes can perform the mission of a heavy bomber, or whether or not they can perform the mission of a bomber equipped for cruise missiles capable of a range in excess of 600 kilometers or whether or not they can perform the mission of a bomber equipped for ASBMs. Functionally related observable differences shall be verifiable by national technical means. To this end, the Parties may take, as appropriate, cooperative measures contributing to the effectiveness of verification by national technical means.

Third Common Understanding. The designations by the United States of America and by the Union of Soviet Socialist Republics for heavy bombers referred to in subparagraph 3(a) of Article II of the Treaty correspond in the following manner:

Heavy bombers of the types designated by the United States of America as the B-52 and the B-1 are known to the Union of Soviet Socialist Republics by the same designations;

Heavy bombers of the type designated by the Union of Soviet Socialist Republics as the Tupolev-95 are known to the United States of America as heavy bombers of the Bear type; and

Heavy bombers of the type designated by the Union of Soviet Socialist Republics as the Myasischev are known to the United States of America as heavy bombers of the Bison type.

5. Launchers of ICBMs and SLBMs equipped with multiple independently targetable re-entry vehicles (MIRVs) are launchers of the types developed and tested for launching ICBMs or SLBMs equipped with MIRVs.

First Agreed Statement. If a launcher has been developed and tested for launching an ICBM or an SLBM equipped with MIRVs, all launchers of that type shall be considered to have been developed and tested for launching ICBMs or SLBMs equipped with MIRVs.

Article IV

4. Each Party undertakes in the process of modernization and replacement of ICBM silo launchers not to increase the original internal volume of an ICBM silo launcher by more than thirty-two percent. Within this limit each Party has the right to determine whether such an increase will be made through an increase in the original diameter or in the original depth of an ICBM silo launcher, or in both of these dimensions.

9. Each Party undertakes not to flight-test or deploy new types of ICBMs, that is, types of ICBMs not flight-tested as of May 1, 1979, except that each Party may flight-test and deploy one new type of light ICBM.

First Agreed Statement. The term "new types of ICBMs," as used in paragraph 9 of Article IV of the Treaty, refers to any ICBM which is different from those ICBMs flight-tested as of May 1, 1979 in any one or more of the following respects:

(a) the number of stages, the length, the largest diameter, the launch-weight, or the throw-weight, of the missile;

(b) the type of propellant (that is, liquid or solid) of any of its stages.

First Common Understanding. As used in the First Agreed Statement to paragraph 9 of Article IV of the Treaty, the term "different," referring to the length, the diameter, the launch-weight, and the throw-weight, of the missile, means a difference in excess of five percent.

11. Each Party undertakes not to flight-test or deploy ICBMs of the one new type permitted pursuant to paragraph 9 of this Article with a number of re-entry vehicles greater than the maximum number of re-entry vehicles with which an ICBM of either Party has been flight-tested as of May 1, 1979, that is, ten.

12. Each Party undertakes not to flight-test or deploy SLBMs with a number of re-entry vehicles greater than the maximum number of re-entry vehicles with which an SLBM of either Party has been flight-tested as of May 1, 1979, that is, fourteen.

Second Agreed Statement. During the flight-testing of any ICBM, SLBM, or ASBM after May 1, 1979 the number of procedures for releasing or for dispensing may not exceed the maximum number of re-entry vehicles established for missiles of corresponding types as provided for in paragraphs 10, 11, 12, and 13 of Article IV of the Treaty. In this Agreed Statement "procedures for releasing or dispensing" are understood to mean maneuvers of a missile associated with targeting and releasing or dispensing its re-entry vehicles to aim points, whether or not a re-entry vehicle is actually released or dispensed. Procedures for releasing anti-missile defense penetration aids will not be considered to be procedures for releasing or for dispensing a re-entry vehicle so long as the procedures for releasing anti-missile defense penetration aids differ from those for releasing or for dispensing re-entry vehicles.

14. Each Party undertakes not to deploy at any one time on heavy bombers equipped for cruise missiles capable of a range in excess of 600 kilometers a number of such cruise missiles which exceeds the product of 28 and the number of such heavy bombers.

First Agreed Statement. For the purposes of the limitation provided for in paragraph 14 of Article IV of the Treaty, there shall be considered to be deployed on each heavy bomber of a type equipped for cruise missiles capable of a range in excess of 600 kilometers the maximum number of such missiles for which any bomber of that type is equipped for one operational mission.

Second Agreed Statement. During the term of the Treaty no bomber of the B-52 or B-1 types of the United States of America and no bomber of the Tupolev-95 or Myasishchev types of the Union of Soviet Socialist Republics will be equipped for more than twenty cruise missiles capable of a range in excess of 600 kilometers.

Article V

1. Within the aggregate numbers provided for in paragraphs 1 and 2 of Article III, each Party undertakes to limit launchers of ICBMs and SLBMs equipped with MIRVs, ASBMs equipped with MIRVs, and heavy bombers equipped for cruise missiles capable of a range in excess of 600 kilometers to an aggregate number not to exceed 1,320.
2. Within the aggregate number provided for in paragraph 1 of this Article, each Party undertakes to limit launchers of ICBMs and SLBMs equipped with MIRVs, and ASBMs equipped with MIRVs to an aggregate number not to exceed 1,200.
3. Within the aggregate number provided for in paragraph 2 of this Article, each Party undertakes to limit launchers of ICBMs equipped with MIRVs to an aggregate number not to exceed 820.
4. For each bomber of a type equipped for ASBMs equipped with MIRVs, the aggregate numbers provided for in paragraphs 1 and 2 of this Article shall include the maximum number of ASBMs for which a bomber of that type is equipped for one operational mission.
5. Within the aggregate numbers provided for in paragraphs 1, 2 and 3 of this Article and subject to the provisions of this Treaty, each Party has the right to determine the composition of these aggregates.

Article VI

1. The limitations provided for in this Treaty shall apply to those arms which are:
 - (a) operational;
 - (b) in the final stage of construction;
 - (c) in reserve, in storage or mothballed;

(d) undergoing overhaul, repair, modernization, or conversion.

2. Those arms in the final stage of construction are:

(a) SLBM launchers on submarines which have begun sea trials;

(b) ASBMs after a bomber of a type equipped for such missiles has been brought out of the shop, plant, or other facility where its final assembly or conversion for the purpose of equipping it for such missiles has been performed;

(c) other strategic offensive arms which are finally assembled in a shop, plant or other facility after they have been brought out of the shop, plant or other facility where their final assembly has been performed.

3. ICBM and SLBM launchers of a type not subject to the limitation provided for in Article V, which undergo conversion into launchers of a type subject to that limitation, shall become subject to that limitation as follows:

(a) fixed ICBM launchers when work on their conversion reaches the stage which first definitely indicates that they are being so converted;

(b) SLBM launchers on a submarine when that submarine first goes to sea after their conversion has been performed.

The Outer Space Treaty

TREATY ON PRINCIPLES GOVERNING THE ACTIVITIES OF STATES IN THE EXPLORATION AND USE OF OUTER SPACE, INCLUDING THE MOON AND OTHER CELESTIAL BODIES

October 10, 1967

Article IV (first paragraph)

States Parties to the Treaty undertake not to place in orbit around the Earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction, install such weapons on celestial bodies, or station such weapons in outer space in any other manner.

The ABM TreatyTREATY BETWEEN THE UNITED STATES OF AMERICA AND THE
UNION OF SOVIET SOCIALIST REPUBLICS ON THE LIMITATION OF
ANTI-BALLISTIC MISSILE SYSTEMS

October 3, 1972

Article I

1. Each Party undertakes to limit anti-ballistic missile (ABM) systems and to adopt other measures in accordance with the provisions of this Treaty.
2. Each Party undertakes not to deploy ABM systems for a defense of the territory of its country and not to provide a base for such a defense, and not to deploy ABM systems for defense of an individual region except as provided for in Article III of this Treaty.

Article II

1. For the purpose of this Treaty an ABM system is a system to counter strategic ballistic missiles or their elements in flight trajectory, currently consisting of: . . .

Article V

1. Each Party undertakes not to develop, test, or deploy ABM systems or components which are sea-based, air-based, space-based, or mobile land-based.
2. Each Party undertakes not to develop, test, or deploy ABM launchers for launching more than one ABM interceptor missile at a time from each launcher, not to modify deployed launchers to provide them with such a capability, not to develop, test, or deploy automatic or semi-automatic or other similar systems for rapid reload of ABM launchers.

Article VI

To enhance assurance of the effectiveness of the limitations on ABM systems and their components provided by the Treaty, each Party undertakes:

(a) not to give missiles, launchers, or radars, other than ABM interceptor missiles, ABM launchers, or ABM radars, capabilities to counter strategic ballistic missiles or their elements in flight trajectory, and not to test them in an ABM mode; and

(b) not to deploy in the future radars for early warning of strategic ballistic missile attack except at locations along the periphery of its national territory and oriented outward.

Article IX

To assure the viability and effectiveness of this Treaty, each Party undertakes not to transfer to other States, and not to deploy outside its national territory, ABM systems or their components limited by this Treaty.

Article XI

The Parties undertake to continue active negotiations for limitations on strategic offensive arms.

Article XIV

1. Each Party may propose amendments to this Treaty. Agreed amendments shall enter into force in accordance with the procedures governing the entry into force of this Treaty.

2. Five years after entry into force of this Treaty, and at five-year intervals thereafter, the Parties shall together conduct a review of this Treaty.

Article XV

1. This Treaty shall be of unlimited duration.

2. Each Party shall, in exercising its national sovereignty, have the right to withdraw from this Treaty if it decides

that extraordinary events related to the subject matter of this Treaty have jeopardized its supreme interests. It shall give notice of its decision to the other Party six months prior to withdrawal from the Treaty. Such notice shall include a statement of the extraordinary events the notifying Party regards as having jeopardized its supreme interests.

Agreed Statements

[D]

In order to insure fulfillment of the obligation not to deploy ABM systems and their components except as provided in Article III of the Treaty, the Parties agree that in the event ABM systems based on other physical principles and including components capable of substituting for ABM interceptor missiles, ABM launchers, or ABM radars are created in the future, specific limitations on such systems and their components would be subject to discussion in accordance with Article XIII and agreement in accordance with Article XIV of the Treaty.

[F]

The Parties agree not to deploy phased-array radars having a potential (the product of mean emitted power in watts and antenna area in square meters) exceeding three million, except as provided for in Articles III, IV, and VI of the Treaty, or except for the purposes of tracking objects in outer space or for use as national technical means of verification.

[G]

The Parties understand that Article IX of the Treaty includes the obligation of the US and the USSR not to provide to other States technical descriptions or blue prints specially worked out for the construction of ABM systems and their components limited by the Treaty.

Unilateral Statements

A. Withdrawal from the ABM Treaty

On May 9, 1972, Ambassador Smith made the following statement:

The U.S. Delegation has stressed the importance the U.S. Government attaches to achieving agreement on more complete limitations on strategic offensive arms, following agreement on an ABM Treaty and on an Interim Agreement on certain measures with respect to the limitation of strategic offensive arms. The U.S. Delegation believes that an objective of the follow-on negotiations should be to constrain and reduce on a long-term basis threats to the survivability of our respective strategic retaliatory forces. The USSR Delegation has also indicated that the objectives of SALT would remain unfulfilled without the achievement of an agreement providing for more complete limitations on strategic offensive arms. Both sides recognize that the initial agreements would be steps toward the achievement of more complete limitations on strategic arms. If an agreement providing for more complete strategic offensive arms limitations were not achieved within five years, U.S. supreme interests could be jeopardized. Should that occur, it would constitute a basis for withdrawal from the ABM Treaty. The U.S. does not wish to see such a situation occur, nor do we believe that the USSR does. It is because we wish to prevent such a situation that we emphasize the importance the U.S. Government attaches to achievement of more complete limitations on strategic offensive arms. The U.S. Executive will inform the Congress, in connection with Congressional consideration of the ABM Treaty and the Interim Agreement, of this statement of the U.S. position.

APPENDIX B

DEFINITIONS and ACRONYMS

DEFINITIONS

ANTI-BALLISTIC
MISSILE (ABM)
SYSTEM:

A system to counter (strategic) ballistic missiles or their elements in flight trajectory, currently consisting of: 1) ABM interceptor missiles, which are interceptor missiles constructed and deployed for an ABM role, or of a type tested in an ABM mode; 2) ABM launchers, which are launchers constructed for launching ABM interceptor missiles; 3) ABM radars, which are radars constructed and deployed for an ABM role, or of a type tested in an ABM mode.

ANTI-BALLISTIC
MISSILE (ABM)
TREATY:

This Treaty is one of the two agreements signed at Moscow on May 26, 1972, known collectively as the SALT I agreements. The original ABM Treaty limited each side to two ABM deployment areas (one national capital area and one ICBM silo launcher area) with restrictions on the deployment of ABM launchers and interceptors (100 of each per area) and ABM radars at these areas. A protocol to the Treaty signed in 1974 further restricted each side to only one ABM deployment area.

AEROSPACE:

Of, or pertaining to, the earth's envelope of atmosphere and the space above it, two separate entities considered as a single realm for activity in launching, guidance and control of vehicles which will travel in both entities.

AIR-BREATHING
MISSILE:

A missile with an engine requiring the intake of air for combustion of its fuel, as in a ramjet or turbojet (in contrast to a rocket-powered missile, which carries its own oxidizer and can operate beyond the atmosphere).

AIR DEFENSE:	All defensive measures designed to destroy attacking enemy aircraft or missiles in the earth's envelope of atmosphere, or to nullify or reduce the effectiveness of such attack.
AIR-TO-AIR MISSILE:	A missile launched from an airborne carrier at a target above the surface.
AIR-TO-SURFACE MISSILE:	A missile launched from an airborne carrier to impact on a surface target.
ANTISUBMARINE WARFARE:	Operations conducted with the intention of denying the enemy the effective use of his submarines.
AREA DEFENSE:	Defense of a wide geographical area against missiles and aircraft.
ARMS CONTROL:	A concept which connotes: a) any plan, arrangement, or process, resting upon explicit or implicit international agreement, governing any aspect of the following: the numbers, types and performance characteristics of weapon systems (including the command and control, logistics support arrangements, and any related intelligence gathering mechanisms); and the numerical strength organization, equipment, deployment or employment of the armed forces retained by the parties. It encompasses "disarmament." b) On some occasions those measures taken for the purpose of reducing instability in the military environment.
ARMS STABILITY:	The condition of greater predictability and restraint which lessens the incentives for reactive force buildups. (See Strategic Stability)
ASSURED DESTRUCTION:	The ability to inflict an "unacceptable" degree of damage upon an aggressor after absorbing any first strike.
AVIONICS:	The application of electronics to aviation and astronautics.
BACK-SCATTER/BACKSCATTERING:	Radiowave propagation in which the direction of the incident and scattered waves, resolved along a reference direction

(usually horizontal), are oppositely directed. A signal received by back-scattering is often referred to as back-scatter.

**BALLISTIC
MISSILE:**

Any missile designed to follow the trajectory that results when it is acted upon predominantly by gravity and aerodynamic drag after thrust is terminated. Ballistic missiles typically operate outside the atmosphere for a substantial portion of their flight path and are unpowered during most of the flight. (see also INTER-CONTINENTAL BALLISTIC MISSILE)

**BALLISTIC MISSILE
DEFENSE (BMD)
SYSTEM:**

A system designed to destroy strategic offensive ballistic missiles or their warheads before they reach their targets.

**BILATERAL
NEGOTIATIONS:**

Negotiations between two countries.

**BINARY CHEMICAL
WEAPON:**

A weapon delivering a lethal chemical agent formed from two chemical precursors through a chemical reaction occurring in a munition or device enroute to the target.

**BIOLOGICAL
WARFARE
OPERATIONS:**

Employment of living organisms, toxic biological products and plant growth regulators to produce death or casualties in man, animals or plants; or defense against such action.

BOMBER:

1) Medium Range: A bomber designed for a tactical operating radius of under 1,000 nautical miles at design gross weight and design bomb load.
2) Intermediate Range: A bomber designed for a tactical operating radius of between 1,000 and 2,500 nautical miles at design gross weight and design bomb load.
3) Long Range: A bomber designed for a tactical operating radius over 2,500 nautical miles at design gross weight and design bomb load.

- BOOSTER:** 1) A high explosive element sufficiently sensitive so as to be actuated by small explosive elements in a fuze or primer and powerful enough to cause detonation of the main explosive filling;
2) An auxiliary or initial propulsion system which travels with a missile or aircraft and which may or may not be separate from the parent craft when its impulse has been delivered. A booster system may contain or consist of one or more units.
- BOOST PHASE:** That portion of the flight of a ballistic missile or space vehicle during which the booster and sustainer engines operate, incorporated into the US NST proposal.
- BREAKOUT:** Noncompliant action(s) by a party to an arms control agreement taken to undercut the central limits of the agreement and thereby achieve a military advantage over another party or parties to the agreement.
- BUILD-DOWN:** A method proposed by members of Congress in 1983 that was adopted by the Executive Branch and incorporated into the US START proposal in Round V of START that was designed to increase strategic stability by implementing reductions of strategic forces while simultaneously encouraging more stabilizing weapon systems. The concept of build-down has also been incorporated into the US NST proposals.
- CHEMICAL AGENT:** A solid, liquid, or gas which, through its chemical properties, produces lethal or damaging effects on man, animals, plants or material, or produces a screening or signaling smoke.
- CHEMICAL DEFENSE:** The methods, plans and procedures involved in establishing and executing defensive measures against attack utilizing chemical agents.

CHEMICAL WARFARE (OPERATIONS):	Employment of chemical agents (excluding riot agents) to: a) kill, or incapacitate for a significant period of time, man or animals; and b) deny or hinder the use of areas, facilities, or material.
CIRCULAR ERROR PROBABLE:	An indicator of the delivery accuracy of a weapon system, used as a factor in determining probable damage to a target. It is the radius of a circle within which half of the missiles projectiles are expected to fall. Also called CEP.
COMMAND, CONTROL, COMMUNICATION:	The exercise of authority and direction by a properly designated commander over assigned forces in the accomplishment of his mission. Command and control functions are performed through an arrangement of personnel, equipment, communications, facilities, and procedures which are employed by a commander in planning, directing, coordinating and controlling forces and operations in the accomplishment of his mission.
COMPLIANCE:	Actions consistent with the intent and purpose of an arms control agreement and in accord with its provisions.
CONVENTIONAL WEAPON:	Nonnuclear weapons. Excludes all biological weapons, and generally excludes chemical weapons except for existing smoke and incendiary agents, and agents of the riot control type.
COUNTERFORCE:	The employment of strategic air and missile forces in an effort to destroy, or render impotent, selected military capabilities of an enemy force under any of the circumstances by which hostilities may be initiated.
COUNTERMEASURES:	That form of military science which, by the employment of devices and/or techniques, has as its objective the impairment of the operational effectiveness of enemy activity.

COUPLING (STRATEGIC):	The linking of a lower level conflict, e.g., Soviet/Warsaw Pact military aggression in Europe, to the use of US strategic deterrent forces such as ICBMs, heavy bombers and SLBMs.
CRISIS STABILITY:	A strategic relationship in which neither side has an incentive to initiate the use of strategic nuclear forces in a crisis situation.
CRUISE MISSILE:	A guided missile which uses aerodynamic lift to offset gravity and propulsion to counteract drag. A cruise missile's flight path remains within the earth's atmosphere.
DECOY:	An imitation in any sense of a person, object or phenomenon which is intended to deceive enemy surveillance devices or mislead enemy evaluation.
DEPLOYMENT:	1) The transition in a weapons system development program from production and testing to installation in operational status at a base or site. 2) However defined, the point at which a weapon becomes accountable in arms control regimes.
DEPRESSED TRAJECTORY:	The trajectory of a ballistic missile fired at an angle to the ground significantly lower than the angle of a minimum energy (maximum range) trajectory. Such a trajectory causes the missile to rise above the line-of-sight radar horizon at a later time and has a shorter time of flight than a missile on a minimum energy trajectory to the same range. This makes detection and tracking more difficult and reduces warning time.
DETERRENCE:	The prevention from action by fear of the consequences. Deterrence is a state of mind brought about by the existence of a credible threat of unacceptable counter-action.

EARLY WARNING:	Early notification of the launch, or approach, of unknown weapons or weapons carriers.
ELECTROMAGNETIC PULSE:	The electromagnetic radiation from a nuclear explosion caused by Compton-recoil electrons and photoelectrons from photons scattered in the materials of the nuclear device in a surrounding medium. The resulting electric and magnetic fields may couple with military systems to produce a damaging current and voltage source.
ELECTRO-OPTICS:	The interaction between optics and electronics leading to the transformation of electrical energy into light, or vice versa, with the use of an optical device.
ELECTRONIC COUNTERMEASURES:	That major subdivision of electronic warfare involving actions taken to prevent or reduce the effectiveness of enemy equipment and tactics employing or affected by electromagnetic radiations and to exploit the enemy's use of such radiation.
ELECTRONIC WARFARE:	That division of the military use of electronics involving actions taken to prevent or reduce an enemy's effective use of radiated electromagnetic energy, and actions taken to ensure our own effective use of radiated electromagnetic energy.
ENCRYPTION:	Encryption is encoding communications for the purpose of concealing information. In SALT II, this term has been applied to a practice whereby a side alters the manner by which it transmits telemetry from a weapon being tested rendering the information deliberately undecipherable.
ENDOATMOSPHERE:	The area from sea level to about 40 nautical miles altitude.
ESCALATION:	An increase in scope or violence of a conflict, deliberate or unpremediated.
EXOATMOSPHERE:	The area higher than about 40 nautical miles above sea level.

- FIRST STRIKE:** The first offensive move of a war. (Generally associated with nuclear operations).
- FIXED LAUNCHER (ICBM):** There are two categories of ICBM launchers - fixed and mobile. Fixed ICBM launchers have traditionally been referred to as either "soft," whereby the missile and most of its launch equipment remain unprotected against nearby nuclear blasts above ground, or "hard," whereby the missile and most of its launch equipment are contained in a hardened underground silo. In both cases the launcher -- the required equipment to launch the missile -- cannot be moved.
- FLEXIBLE RESPONSE:** The capability of military forces for effective reaction to any enemy threat or attack with actions appropriate and adaptable to the circumstances existing.
- FRACTIONATION:** The division of the payload of a missile into several warheads. The use of a MIRV payload is an example of fractionation.
- HARDENED SITE:** A site constructed to withstand the blast and associated effects of a nuclear attack and likely to be protected against a chemical, biological, or radiological attack.
- HEAVY BALLISTIC MISSILE:** For the purpose of SALT II, ballistic missiles are divided into two categories according to their throw-weight and launch-weight: light and heavy. Heavy missiles (ICBMs, SLBMs, and ASBMs) are those missiles which have a launch-weight or throw-weight greater than the launch-weight or throw-weight of the Soviet SS-19 ICBM.
- HOMING:** The technique of tracking along a position line towards the point of origin of a radio, radar or other navigation aid.
- INERTIAL GUIDANCE:** A guidance system designed to project a missile over a predetermined path, wherein the path of the missile is adjusted after

launch by devices wholly within the missile and independent of outside information. The system measures and converts accelerations experienced to distance traveled in a certain direction.

INTERCONTINENTAL
BALLISTIC
MISSILE
(ICBM):

A land-based fixed or mobile rocket-propelled vehicle capable of delivering a warhead to intercontinental ranges. Once they are outside the atmosphere, ICBMs fly to a target on an elliptical trajectory. An ICBM consists of a booster, one or more re-entry vehicles, possibly penetration aids, and, in the case of a MIRVed missile, a postboost vehicle. For the purposes of SALT II, an ICBM is considered to be a land-based ballistic missile capable of a range in excess of 5,500 km (about 3,000 nautical miles).

INTERMEDIATE
RANGE BALLISTIC
MISSILE:

A ballistic missile, with a range capability from about 1,500 to 3,000 nautical miles. See ICBM.

INTERMEDIATE
RANGE NUCLEAR
(INF) FORCES:

Land-based nuclear systems (missiles or aircraft) with ranges between approximately 400 kilometers and 5,500 kilometers.

INTERMEDIATE
RANGE NUCLEAR
FORCES
NEGOTIATIONS:

US-Soviet arms control negotiations begun in November 1981 aimed at eliminating or achieving limitations and reductions of INF systems.

LAUNCHER:

That equipment which launches a missile. ICBM launchers are land-based launchers which can be either fixed or mobile. SLBM launchers are the missile tubes on a ballistic missile submarine. An ASBM launcher is the carrier aircraft with associated equipment. Launchers for cruise missiles can be installed on aircraft, ships, or land-based vehicles or installations.

LAUNCH-ON-
WARNING:

A doctrine calling for the launch of ballistic missiles when a missile attack against them is detected and before the attacking warheads reach their targets.

LAUNCH UNDER ATTACK:	Execution by National Command Authorities of Single Integrated Operational Plan Forces subsequent to tactical warning of strategic nuclear attack against the United States and prior to first impact.
LAUNCH WEIGHT:	The weight of the fully loaded missile itself at the time of launch. This would include the aggregate postboost vehicle (PLV) and the payload.
LIGHT BALLISTIC MISSILE:	For the purposes of SALT II, ballistic missile are divided into two categories according to their throw-weight and launch-weight: light and heavy. The Soviet SS-19 ICBM is acknowledged by both sides as the heaviest of the existing light ICBMs on either side.
MANEUVERABLE RE-ENTRY VEHICLE (MARV):	A re-entry vehicle capable of performing preplanned flight maneuvers during the re-entry phase.
MEDIUM-RANGE BALLISTIC MISSILE:	A ballistic missile with a range capability from about 600 to 1,500 nautical miles.
MEGATON:	A unit of measurement for nuclear yield equivalent to the energy released from one million tons of TNT.
MID-COURSE PHASE:	That portion of the trajectory of a ballistic missile between the boost phase and the re-entry phase.
MOBILE (ICBM) LAUNCHER:	Equipment which launches an ICBM and which can move or be moved from one location to another. Mobile ICBM launchers could include ICBM launchers on wheeled vehicles, launchers on vehicles which travel on rails, and launchers which are moved among launch-points which might themselves be "hard" or "soft."
MOBILITY:	A quality or capability of military forces which permits them to move from place to place while retaining the ability to fulfill their primary mission.

MULTILATERAL NEGOTIATIONS:	Negotiations between more than two countries.
MULTIPLE INDEPENDENTLY- TARGETABLE RE-ENTRY VEHICLES (MIRV):	Re-entry vehicles carried by a delivery system which can place one or more re-entry vehicles over each of several separate targets.
MUTUAL ASSURED DESTRUCTION (MAD):	The ability to inflict an "unacceptable" degree of damage upon an aggressor after absorbing any first strike. MAD is a condition in which assured destruction capability is possessed by opposing sides.
MUTUAL AND BALANCED FORCE REDUCTIONS:	An on-going negotiation between NATO/Warsaw Pact countries on the reduction and limitation of conventional military forces in central Europe.
MX (MISSILE EXPERIMENTAL):	A new US ICBM (the PEACEKEEPER).
NATIONAL TECHNICAL MEANS (NTM):	Assets which are under national control for monitoring compliance with the provisions of an agreement. NTM include photographic reconnaissance satellites, aircraft-based systems (such as radars and optical systems), as well as sea- and ground-based systems such as radars and antennas for collecting telemetry.
NORTH ATLANTIC TREATY ORGANIZA- TION (NATO):	An organization, also known as the Atlantic Alliance, consisting of the signatories of the North Atlantic Treaty. Present members are Belgium, United Kingdom, Canada, Denmark, France, Spain, Greece, Iceland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Turkey, West Germany, and the US. France is no longer participating militarily. Spain is not integrated into the military structure.
NUCLEAR WEAPON:	A device in which the explosion results from the energy released by reactions involving atomic nuclei, including fission and/or fusion.

**PENETRATION AIDS
(ACTIVE AND
PASSIVE):**

Devices employed by offensive weapon systems, such as ballistic missiles and bombers, to increase the probability of penetrating enemy defenses. They are frequently designed to simulate or to mask an aircraft or ballistic missile warhead in order to mislead enemy radar and/or divert defensive anti-aircraft or anti-missile fire.

**POST-BOOST VEHICLE
(PBV):**

Often referred to as a "bus," the PBV is that part of a missile which carries the re-entry and thrust devices for altering the ballistic flight path so that the re-entry vehicles can be dispensed sequentially toward different targets (MIRVs). Ballistic missiles with single RVs also might use a PBV to increase the accuracy of the RV by placing it more precisely into the desired trajectory.

**PRE-LAUNCH
SURVIVABILITY:**

The probability that a delivery and/or launch vehicle will survive an enemy attack under an established condition of warning.

**PRE-EMPTIVE
ATTACK:**

An attack initiated on the basis of incontrovertible evidence that an enemy attack is imminent.

**PROLIFERATION
(NUCLEAR WEAPONS):**

The process by which one nation after another comes into possession of, or into the right to determine the use of nuclear weapons, each potentially able to launch a nuclear attack upon another nation.

**RAPID RELOAD
CAPABILITY:**

The capability of a launcher to fire a second missile within a short period of time after an initial missile firing.

REAL-TIME:

The absence of delay, except for the time required for the transmission by electromagnetic energy, between the occurrence of an event or the transmission of data, and the knowledge of the event, or reception of the data at some other location.

RECONNAISSANCE:	A mission undertaken to obtain, by visual observation or other detection methods, information about the activities and resources of an enemy or potential enemy; or to secure data concerning the meteorological, hydrographic or geographic characteristics of a particular area.
RE-ENTRY PHASE:	That portion of the trajectory of a ballistic missile where there is a significant interaction of the vehicle and the earth's atmosphere.
RE-ENTRY VEHICLE (RV):	That portion of a ballistic missile which carries the nuclear warhead. It is called a re-entry vehicle because it re-enters the earth's atmosphere in the terminal portion of the missile trajectory.
SEA CONTROL OPERATIONS:	The employment of naval forces, supported by land and air forces, as appropriate, to achieve military objectives in vital sea areas. Such operations include destruction of enemy naval forces, suppression of enemy sea commerce, protection of vital sea lanes, and establishment of local military superiority in areas of naval operations.
SECOND-STRIKE:	The first counter blow of a war. Generally associated with nuclear operations.
SONAR:	A sonic device used primarily for the detection and location of underwater objects. (The term is derived from the words "Sound Navigation And Ranging")
STANDOFF:	The desirable characteristic of a weapon system that permits the attacking aircraft to launch an attack on the target at a safe distance, usually outside the range of counterfire.
STRATEGIC ARMS LIMITATION TALKS:	A series of negotiations between the US and the USSR which began in November 1969. The negotiations sought to limit and reduce both offensive and defensive strategic arms. The first round of negotiations, known as SALT I, concluded in May 1972

and resulted in two agreements -- the ABM Treaty and the Interim Agreement on Certain Measures with Respect to the Limitation of Strategic Offensive Arms. SALT II, begun in November 1972, includes a treaty, a protocol of shorter duration, and a Joint Statement of Principles and Basic Guidelines for Subsequent Negotiations on the Limitation of Strategic Arms. The SALT II Treaty was signed in June 1979 but was never ratified.

**STRATEGIC ARMS
REDUCTION TALKS:**

Bilateral US-Soviet negotiations for reductions of strategic nuclear arms, proposed by President Reagan to Soviet President Brezhnev in the Spring of 1982, and opened on June 29, 1982, in Geneva. The USSR participated in five rounds of negotiations before suspending the talks because of allied INF deployments in Europe.

**STRATEGIC DEFENSE
INITIATIVE:**

A US research program which emphasizes advanced non-nuclear defensive technologies, with the aim of finding better ways of deterring aggression, strengthening stability, and increasing the security of the United States and its allies. The research will provide to a future President and a future Congress, possibly in the early 1990s, the technical knowledge required to support a decision on whether to develop and later deploy advanced defensive systems.

**STRATEGIC
STABILITY:**

The maintenance of conditions such that neither the US nor the USSR would feel compelled to use its nuclear forces. (See ARMS STABILITY).

STRATEGIC WARNING:

A notification that enemy-initiated hostilities may be imminent. This notification may be received from minutes to hours to days or longer, prior to the initiation of hostilities.

SUBMARINE (SSBN; SSB; SSG; SSGN; SSN; SS):	A warship designed for under-the-surface operations with primary mission of locating and destroying ships, including other submarines. It is capable of various other naval missions. Nuclear-powered submarines contain the letter designation "N". Submarines which carry ballistic missiles contain the letter designation "B". In some countries (not the US), submarines for carrying cruise missiles contain the letter designation "G". Multipurpose attack submarines are designated SSN or SS.
SURFACE-TO-AIR MISSILE (SAM):	A surface-launched missile designed to operate against a target above the surface.
SURVEILLANCE:	The systematic observation of aerospace, surface or subsurface areas, places, persons or things by visual, aural, electronic, photographic or other means.
TACTICAL NUCLEAR (FORCES, WEAPONS):	Nuclear weapons for use by land, sea or air forces against opposing forces, supporting installations or facilities, in support of operations, which contribute to the accomplishment of a military mission of limited scope, or in support of the military commander's scheme of maneuver, usually limited to the area of military operations.
TACTICAL WARNING:	1) A notification that the enemy has initiated hostilities. Such warning may be received anytime from the launching of the attack until it reaches its target. 2) In satellite and missile surveillance, a notification to operational command centers that a specific threat event is occurring.
TARGET ACQUISITION:	1) The detection, identification and location of a target in sufficient detail to permit the effective employment of weapons. 2) Process of positioning the tracking apparatus of a weapon system so that a designated target is tracked.

TELEMETRY: Refers to vehicle flight test data concerning the status and performance of various vehicle subsystems and components which is transmitted by high frequency electromagnetic signals from the vehicle to a ground station or other receiving station.

TERMINAL DEFENSE: That which attempts to defend the intended target against incoming aircraft or missiles at relatively short range in the earth's atmosphere.

TERMINAL PHASE: That portion of the trajectory of a ballistic missile between re-entry into the atmosphere and impact or arrival in the vicinity of the target.

THEATER: The geographical area outside the continental United States for which a commander of a unified or specified command has been assigned military responsibility.

THERMONUCLEAR WEAPON: A weapon in which very high temperatures are used to bring about the fusion of light nuclei, such as those of hydrogen isotopes (e.g., deuterium and tritium), with the accompanying release of energy. The high temperatures required are obtained by means of fission.

TRIAD: The term used in referring to the basic structure of the US Strategic deterrent force. It is comprised of land-based ICBMs, the strategic bomber force, and the POSEIDON/TRIDENT submarine fleet.

THROW-WEIGHT: Ballistic missile throw-weight is the useful weight which could be placed on a trajectory toward the target by the boost or main propulsion stages of the missile. For the purposes of SALT II, throw-weight was defined as the sum of the weight of:

• the RV or RVs;

- ° any PBV or similar device for releasing or targeting one or more RVs; and
- ° Any antiballistic missile penetration aids, including their release devices.

VERIFICATION:

The process of determining, to the extent necessary to adequately safeguard national security, that the other side is complying with an agreement. This process of judging adequacy takes into account the monitoring capabilities of existing and future intelligence collection systems and analysis techniques and the ability of the other side to evade detection if it should attempt to do so. This process also assesses the political and military significance of potential violations and the costs, risks, and gains to a side of cheating.

VULNERABILITY:

- 1) The susceptibility of a nation or military force to any action by any means through which its war potential or combat effectiveness may be reduced or its will to fight diminished.
- 2) The characteristics of a system which cause it to suffer a definite degradation (incapability to perform the designated mission) as a result of having been subjected to a certain level of effects in an unnatural (man-made) hostile environment.

WARHEAD:

The part of a missile, projectile, torpedo, rocket, or other munition which contains either the nuclear or the thermonuclear system, high explosive system, chemical or biological agents or inert materials intended to inflict damage.

WEAPON SYSTEMS:

A weapon and those components required for its operation. (The term is not precise unless specific parameters are established).

YIELD:

The energy released in an explosion. The energy released in the detonation of a nuclear weapon is generally measured in terms of the kilotons (kT) or megatons (MT) of TNT required to produce the same energy release.

ACRONYMS

ABM	Anti-Ballistic Missile
ACIA	Arms Control Impact Analysis
ACIS	Arms Control Impact Statement
ACM	Advanced Cruise Missile
ALBM	Air-Launched Ballistic Missile
ALCM	Air-Launched Cruise Missile
ASAT	Anti-Satellite
ASBM	Air-to-Surface Ballistic Missile
ASM	Air-to-Surface Missile
ASMS	Advanced Strategic Missile Systems
ASOS	Airborne Strategic Offensive System
ASROC	Anti-Submarine Rocket
ASW	Anti-Submarine Warfare
ATB	Advanced Technology Bomber
AWACS	Airborne Warning and Control System
BMD	Ballistic Missile Defense
C ³ or CCC	Command, Control, and Communication
C ³ I or CCCI	Command, Control, Communication and Intelligence
CCSEP	Command and Control System Evaluation Program
CD	Conference on Disarmament
CDE	Conference on Disarmament in Europe
CELV	Complementary Expendable Launch Vehicle
CEP	Circular Error Probable
CERR	Configuration Enhanced Radiation Rejection
CG	Guided-missile Cruiser
CONUS	Continental United States
CSCE	Conference on Security and Cooperation in Europe
CSRL	Common Strategic Rotary Launcher
CV	Aircraft Carrier
CW	Chemical Warfare
CWC	Chemical Weapons Convention
DARPA	Defense Advanced Research Projects Agency
DD	Destroyer
DDG	Guided-missile Destroyer
DEW	Directed Energy Weapons
DL	Damage Limiting
DoD	Department of Defense
DoE	Department of Energy
DST	Defense and Space Talks
ECCM	Electronic Counter-Counter Measure
ECM	Electronic Counter Measure
ELF	Extremely Low Frequency

ELINT	Electronic Intelligence
EMP	Electro-Magnetic Pulse
EOD	Externally Observable Differences
EORSAT	Electronic Ocean Reconnaissance Satellite
EW	Electronic Warfare
FBMS	Fleet Ballistic Missile System
FPG	Guided-missile Frigate
POC	Full Operational Capability
FROD	Functionally Related Observable Difference
FY	Fiscal Year
GEODSS	Ground-Based Electro-Optical Deep Space Surveillance
GIUK	Greenland, Iceland, United Kingdom
GLCM	Ground-Launched Cruise Missile
GPS	Global Positioning System
HEL	High Energy Lasers
HICBM	Heavy ICBM
HMMWV	High-Mobility, Multi-purpose Wheeled Vehicle
IAEA	International Atomic Energy Agency
ICBM	Intercontinental Ballistic Missile
ICF	Inertial Confinement Fusion
INF	Intermediate-Range Nuclear Forces
IOC	Initial Operational Capability
IONDS	Integrated Operational Nuclear Detection System
IR	Infrared
IRBM	Intermediate-Range Ballistic Missile
JCS	Joint Chiefs of Staff
KEW	Kinetic Energy Weapons
KM	Kilometer
KT	Kiloton
KW	Kilowatt
LRTNF	Long-Range Theater Nuclear Forces
LRINF	Longer-Range Intermediate Range Nuclear Forces
LTBT	Limited Test Ban Treaty
M	Meter
MaRV	Maneuvering Re-entry Vehicle
MBFR	Mutual and Balanced Force Reductions
MCC	Mission Control Center

MIRACL	Mid-Infrared Advanced Chemical Laser
MIRV	Multiple Independently Targeted Re-entry Vehicle
MLRS	Multiple Launch Rocket System
MRASM	Medium Range Air-to-Surface Missile
MRV	Multiple Re-entry Vehicle
MT	Megaton
MV	Miniature Vehicle
NATO	North Atlantic Treaty Organization
NAVSTAR	Navigation Satellite Timing and Ranging
NBC	Nuclear Biological Chemical
NCA	National Command Authority
NDEW	Nuclear-driven Directed Energy Weapons
NM	Nautical Mile
NMCC	National Military Command Center
NORAD	North American Air Defense
NPT	Non-Proliferation Treaty
NSSC	NORAD Space Surveillance Center
NSDD	National Security Decision Directive
NST	Nuclear and Space Talks
NTM	National Technical Means
OSD	Office of the Secretary of Defense
OTH	Over-the-Horizon
OTH-B	Over-the-Horizon Backscatter
OTH-T	Over-the-Horizon Targeting
PADS	Penetration Aids Deployment System
PAL	Permissive Action Link
PB	Particle Beam
PBV	Post Boost Vehicle
PBW	Particle Beam Weapon
PMOC	Prototype Missions Operations Center
PNET	Peaceful Nuclear Explosion Treaty
POL	Petroleum, Oil, Lubrication
PSI	Pounds per Square Inch
R&D	Research and Development
RDTE	Research, Development, Test, and Evaluation
RORSAT	Radar Ocean Reconnaissance Satellite
RPV	Remotely Piloted Vehicle
RV	Re-entry Vehicle
RW	Radiological Weapons
SAC	Strategic Air Command
SALT	Strategic Arms Limitation Talks

SATCOM	Satellite Communications
SATKA	Surveillance, Acquisition, Tracking and Kill Assessment
SCC	Standing Consultative Commission
SDI	Strategic Defense Initiative
SEC	Survivable and Endurable Communications
SENT	Severe Environment Noisetip Test
SIGINT	Signal Intelligence
SICBM	Small ICBM
SLBM	Submarine-Launched Ballistic Missile
SLCM	Sea-Launched Cruise Missile
SLEP	Service Life Extension Program
SLFCS	Survivable Low Frequency Communication System
SLOC	Sea Lines of Communication
SNDV	Strategic Nuclear Delivery Vehicle
SOARS	Satellite On-Board Attack Reporting System
SOSUS	Sound Surveillance System
SOTAS	Stand-off Target Acquisition System
SOW	Stand-off Weapon
SPADCCS	Space Defense Command and Control Center
SPADOC	Space Defense Operations Center
SRAM	Short-Range Attack Missile
SRINF	Shorter-Range Intermediate Range Nuclear Forces
SNF	Short-range Nuclear Forces
SSBN	Nuclear-Powered Ballistic Missile Submarine
SSN	Nuclear-Powered Attack Submarine
START	Strategic Arms Reduction Talks
SUAWACS	Soviet Union AWACS
SURTASS	Surface Towed Array Sensor System
TACAMO	Take Charge and Move Out
TASM	TOMAHAWK Anti-Ship Missile
TASS	Towed Array Sensor System (Submarine)
TERCOM	Terrain Contour Matching
TLAM-C	TOMAHAWK Land-Attack Missile - Conventional
TLAM-N	TOMAHAWK Land-Attack Missile - Nuclear
TMGS	Transportable Mobile Ground Station
TNF	Theater Nuclear Forces
TTBT	Threshold Test Ban Treaty
UHF	Ultra-High Frequency
UNGA	United Nations General Assembly
USA	United States Army
USAF	United States Air Force
USG	United States Government
USN	United States Navy
VLA	Vertical Launch Anti-submarine Rocket
VLF	Very Low Frequency
VLS	Vertical Launch System
V/STOL	Vertical/Short Takeoff and Landing
WWMCCS	Worldwide Military Command and Control System